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Marine Fisheries Abstracts

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Marine Fisheries Abstracts

UNITED STATES DEPARTMENT OF COMMERCE

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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

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NATIONAL MARINE FISHERIES SERVICE

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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Marine Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Marine Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

0.35 STUDIES ON CAROTENOPROTEIN IN AQUATIC ANIMALS. IV. CAROTENOID PIGMENTS IN CRAYFISH (PROCAMBARUS CLARKII)

Nakagawa, Heisuke, Mitsu Kayama (Dept. of Fisheries, Hiroshima University, Fukuyama, Japan), Hisashi Yamada, and Suezo Asakawa
Journal of the Faculty of Fisheries and Animal Husbandry, Hiroshima University 13, No. 1, 1-13 (July 1974)

The pigmentation of the exoskeleton of the crayfish was studied. The major pigments in the exoskeleton of the crayfish were astaxanthin ester, astaxanthin, and astacin. Astaxanthin, the prosthetic group of caroteno-proteins, occurred at higher levels in the exoskeleton of the cepharothorax and the abdomen and tail than in that of the chelae and legs. There was little difference between the carotenoid composition between the blue and the red chela exoskeletons.
[4 figures, 2 tables, 25 references]

FTP

0.36 GLYCOLYTIC ENZYMES IN MUSCLE OF THE PACIFIC DOLPHIN: ROLE OF PYRUVATE KINASE IN AEROBIC-ANAEROBIC TRANSITION DURING DIVING

Storey, K. B., and P. W. Hochachka (Dept. of Zoology, University of British Columbia, Vancouver 8, British Columbia, Canada)
Comparative Biochemistry and Physiology 49, No. 1B, 119-128 (Sept. 15, 1974)

Diving mammals carry most of their oxygen combined with hemoblogin and myoglobin (a type of protein) in muscles. When the myoglobin is cut off from circulating blood early in a dive, an accumulation of lactate (an end product of carbohydrate metabolism) occurs in the muscle. Other workers suggest that lack of oxygen and rapid accumulation of lactate implicate anaerobic glycogenolysis as the major source of energy of skeletal muscle in a diving mammal. However, very little is known about the enzymes in anaerobic muscle glycolysis.

The activities of glycolytic enzymes in dolphin muscle were compared with those in the muscles of other mammals. The levels of the enzymes were shown to be similar for the dolphin and nondivers, except for levels of lactate dehydrogenase, aldolase, and phosphoglucomutase, which were higher in the dolphin. Pyruvate kinase was the only glycolytic enzyme that had lower activity levels in the dolphin muscle than in the nondiving mammals. Further investigation of the properties of pyruvate kinase showed that it has optimum activity in acid pH; it is strongly inhibited by low levels of adenosine triphosphate (ATP); and it is controlled by fructose-1,6-diphosphate (FDP). The significance of ATP inhibition of muscle glycolysis by pyruvate kinase is suggested by the authors to be important in "turning off" the enzyme at the end of diving when aerobic conditions return. the FDP is important, during the dive,

0.39 (0.4) KINETICS OF PROLYTIC EVENTS DURING RED CELL LYSIS INDUCED BY SEA ANEMONE NEMATOCYST VENOM

Hessinger, David A. (Dept. of Biology, University of South Florida, Tampa, FL 33620), and Howard M. Lenhoff
Comparative Biochemistry and Physiology 49, No. 1B, 139-150 (Sept. 15, 1974)

Nematocysts are minute capsules containing coiled tubes; venom is ejected from the tubes, upon proper stimulation, to capture prey or in defense against predators. The venom can cause painful irritations and sometimes fatal poisoning of swimmers and divers. Nematocysts are characteristically present in members of the phylum coelenterata (or cnidaria) which includes the hydroids (Portuguese man-o'-war), jellyfishes, corals, and sea anemones. Nematocysts were isolated from the sea anemone (Aiptasia pallida) grown in the laboratory.

The nematocysts were made to discharge their venom; the venom was separated by centrifugation; and the venom was desalted by dialysis. Hemolysis reactions by the venom were performed on washed red blood cells (RBC) of Sprague-Dawley rats. Two toxic activities of the venom have been identified by other workers: hemolytic and neurotoxic. Hemolysis caused by the venom is rapid and is due to the interaction of the venom proteins and the calcium ion (Ca^{2+}) with the red cell membrane. The hemolysis involves two phases: the induction or prolytic and the lytic. The kinetics of the prolytic phase and the sequence of venom proteins and Ca^{2+} interaction with red cell membrane were investigated.

0.4 OBSERVATIONS OF BEACH STRANDINGS OF THE PHYSALIA (PORTUGUESE-MAN-OF-WAR) COMMUNITY

Bingham, Frasier O., and Helen D. Albertson (Rosenstiel School of Marine and Atmospheric Science, University of Miami, Miami, FL 33149)
Veliger 17, No. 2, 220-224 (Oct. 1, 1974)

The Portuguese-man-of-war, a coelenterate, is found associated with other animals including purple snails and the man-of-war fish. This assembly of animals is normally found together, and the authors refer to it as a community. Since the community cannot be studied intently at sea, its interactions and make up can be observed by examining one that has been stranded on a local beach. The authors caution that Physalia is a difficult animal to work with because sensitivity to its toxins develops quickly in spite of careful handling techniques. Symptoms such as headache, inflammation of the eyes, copious discharges from the nose and sinus areas, and general discomfort occur during collection and measurement of the animals although thick rubber gloves are worn.

Ten strandings of the Physalia community were collected from the shoreline of Key Biscayne, Fla. from December 1971 to April 1972. Three species of coelenterates and five species of snail were observed. The snails feed mostly on the coelenterates, and one of the snails, Glaucus marinus, actively feeds on the toxin containing nematocysts of the coelenterate. The man-of-war fish abandons the community shortly before it is stranded on the beach. The variability of the species composition suggests to the authors that the community has a loose structure, most of the relationships being on the predator-prey level.

0.36

because it increases the affinity of pyruvate kinase for the substrate, glycogen, and it also increases glycolytic activity of the enzyme; furthermore, FDP reverses the ATP inhibition of the enzyme's glycolytic activity when aerobic pathways become inactive during a dive.

The muscle tissue of a Pacific, white, striped dolphin was the source of the enzyme pyruvate kinase used in the experiments. Descriptions of enzyme assays are also presented.

[5 figures, 1 table, 15 references] SW

0.4

The Physalia community has been reported to be dimorphic: left sailing and right sailing forms. In calm weather, the tentacles of the jellyfish may extend many meters below the surface; when driven by a a moderate wind, the tentacles stream out behind the floating portion. Other reports also indicate that the Physalia community is a major food source for several species of sea turtles including the Atlantic hawksbill and the Atlantic loggerhead. The authors placed Physalia specimens into tanks holding young Atlantic green and leatherback turtles. The turtles ate the coelenterate actively with no ill effects. The man-of-war fish, associated with Physalia, was also observed eating the tentacles of the coelenterate.

[1 figure, 2 tables, 16 references] MS

0.4 PHARMACOLOGICAL EVALUATION OF AN EXTRACT FROM EISENIA BICYCLIS

Whittaker, D. M., and G. P. Carlson
Marine Reprint No. 24, University of Rhode Island, Narragansett, RI 02881 (1974), 5 pp.

This article was reprinted from the Marine Technology Society Food-Drugs from the Sea Proceedings 1972. The study involved an examination for pharmacological activity of an extract from the algae E. bicyclis collected from the shores of Korea. The extract contained primarily a polyphenolic-like polymer with a molecular weight of about 10,000. The extract containing the polyphenolic polymer from the algae was capable of inhibiting protein denaturation and rat paw edema formation induced by carrageenan. The extract had no effect on microsomal drug metabolism and had no gastrogenic activity.

[1 figure, 8 tables, 8 references] FTP

0.35 OXYGEN CONSUMPTION AND LIPID CONTENT IN RED AND WHITE MUSCLES OF ANTARCTIC FISHES

Lin, Yuan, Gary H. Dobbs, III, and Arthur L. Devries (Scripps Institution of Oceanography, University of California, La Jolla, CA 92037)
Journal of Experimental Zoology 189, No. 3, 379-385 (Sept. 1974)

Fish commonly contain two types of muscle fibers, the white and the red. The red muscle fibers usually consist of a thin lateral strip just under the skin at the level of the lateral line of the fish. In salmonids the red muscle fibers are spread in the myotome with the white muscle; in some scombrids the red muscle fibers form a core around the vertebral column. Red muscle is believed to be used mainly for sustained, slow speed swimming, and lipid is the main energy source. White muscle is involved in vigorous short-term swimming, and anaerobic breakdown of the glycogen provides the energy required. The Antarctic notothenid fishes have red muscle fibers that are confined to the pectoral girdle region of the body. These muscles move the pectoral fins in such a way as to propel the fish during sustained, low speed cruising. Because the red muscles in these Antarctic fishes are located only in the pectoral girdle, their function in sustained swimming is not disputed. In this study the oxygen consumption rate and the ultrastructure of the red muscle were examined. The metabolic rates of the red muscle and the white muscle were determined at temperatures between -1.8° C (environmental temperature) and 12° C.

The researchers found that the metabolic rate (rate of oxygen consumption) and the lipid content of the red muscle were higher than those in the white muscle. Large numbers of lipid droplets and mitochondria arranged in close association were found in the red muscle by means of the electron microscope. These results indicate that the red muscle is used for long, sustained swimming motion, and that the lipid, rather than the glycogen, is the main source of energy for this activity.

[2 tables, 23 references] FTP

0.39 (1.4)

In tests where levels of RBC varied while Ca^{2+} and venom concentrations were constant, the rates of hemolysis increased with increasing RBC levels; however, the induction time remained the same at all RBC levels. In tests where RBC and Ca^{2+} remained constant and venom levels varied, the induction time was inversely proportional to venom levels. In tests where the Ca^{2+} level was varied and RBC level was constant, at two constant levels of venom, the induction time was inversely proportional to Ca^{2+} levels, and the rates of lysis varied directly with Ca^{2+} levels. In tests where RBC were incubated with venom before a constant level of Ca^{2+} was added, the following results were shown: lysis did not occur in the absence of Ca^{2+}; the longer the RBC were incubated with venom, the faster the onset of lysis occurred on the addition of Ca^{2+}; in all cases, 100% lysis took place; and the rate of lysis progressively decreased with increasing time of incubation. The decrease is due; according to another report, to the instability of dilute concentrations of venom. Other test results also indicated that Ca^{2+} has a primary role during the induction phase of hemolysis.

Based on the results, the authors suggest that sequential events occur in the induction phase of hemolysis: the first event is affected by venom concentration and has two subphases--a rapid one and a slow one. These suggest a differential rate of binding of the two known lytic factors of venom; the second event involves the interaction of Ca^{2+} with a complex formed by the venom proteins bound to the red cell membrane.

[8 figures, 26 references] SW

0.4
(9.19)

THE TOXICITY OF SOME DETERGENTS TESTED ON AEDES AEGYPTI L., LEBISTES RETICULATUS PETERS, AND BIOMPHALARIA GLABRATA (SAY)

Van Emden, H. M., C. C. M. Kroon, E. N. Schoeman, and H. A. van Seventer (Dept. of the Royal Tropical Institute, Laboratory of Parasitology, University of Amsterdam, Amsterdam, The Netherlands)
Environmental Pollution 6, No. 4, 297-308 (June 1974)

The development of synthetic detergents was carried out primarily to produce laundry washing compounds that would not lose their effectiveness in the presence of calcium and magnesium salts (in hard water) which interfere with fatty acid soaps. The detergents were differentiated into four groups: anion active, cation active, nonionic and ampholytes. The anion active detergents include the natural fatty acid soaps, the alkyl sulfates, and the alkyl benzene sulfonates. The nonionic detergents are generally based on ethene and propene oxide. The cation active compounds have primarily a bactericidal action (such as hexachlorophene), and the ampholytes are specialty compounds, which may be alkaline or acid depending on pH, used in shampoos and other products. The toxicity of some anion active and nonionic detergents was investigated on three groups of aquatic animals: the yellow-fever transmitting mosquito, Aedes aegypti L.: the guppy; Lebistes reticulatus Peters, a fish used to control mosquitoes; and a snail Biomphalaria glabrata (Say), the vector of the tropical disease bilharziasis (schistosomiasis).

In the mosquito, developmental forms from the fourth stage larvae to the pupae were most sensitive to anion active detergents. Females preferred to lay eggs in solutions containing the least concentrations of detergent; in 500 p/m concentrations of detergent, 50% of the eggs hatched. In all concentrations of detergents tested,

0.5

MICROBIOLOGICAL FOOD HAZARDS TODAY -- BASED ON EPIDEMIOLOGICAL INFORMATION

Bryan, Frank L. (Center for Disease Control, Public Health Service, U.S. Dept. of Health, Education and Welfare, Atlanta, GA 30333)
Food Technology 28, No. 9, 52, 54, 58-60, 62, 64-65, 84 (Sept. 1974)

Of 1,703 outbreaks of foodborne disease reported in the years 1968 through 1972, staphylococcal intoxication, salmonellosis, and gastroenteritis due to Clostridium perfringens were the most frequent. Illnesses caused by Vibrio parahaemolyticus, Bacillus cereus, and enteropathogenic Escherichia coli appeared to become apparent foodborne problems in this period.

Most of the outbreaks were associated with food service operations, and only 6% were associated with mishandling in food processing plants. However, because of enormous quantities of food processed in these plants, one case of mishandling can expose hundreds of consumers to illness. Microbial hazards in food processing plants may be caused by: contaminated raw foods; failure of processes that normally destroy pathogens; contamination of foods after processing; and growth of bacteria due to environmental conditions (such as extended cooling periods). Inadequate refrigeration was the major factor in food service establishments and food processing plants that contributed to producing outbreaks of food poisoning. Other factors resulting in outbreaks are preparing foods far in advance of consumption with inadequate storage, infected persons touching foods after final heat processing, and holding foods in warming devices at temperatures that favor bacterial growth.

0.4
(9.6)

BIOLOGICAL CLOCKS IN MARINE ORGANISMS: THE CONTROL OF PHYSIOLOGICAL AND BEHAVIORAL TIDAL RHYTHMS

Palmer, John D. (New York University)
John Wiley & Sons, Inc., New York, N.Y. (1974), x + 173 pp.

There are many rhythmic physiological, biochemical, electrochemical, and behavioral aspects of life in organisms. Some of these rhythms match the prominent geophysical cycles on earth and have such properties as: (1) they continue when isolated from cycles in the environment, (2) the cycle is independent of temperature and immune to alteration by many chemicals, and (3) a phase in the cycle can be reset to any desired time. These rhythms have periods that approximate 1 year, a synodic month (29.5 days), a lunar day (24.8 hours), a solar day, and a tidal interval. Since these rhythms persist in the organisms while in the laboratory, where the major entraining environmental cycles are excluded, postulations have been made that the rhythms are controlled by a timing mechanism called the "biological clock." The mode of functioning of the clock is unknown, but all hypothetical explanations have been explained by two clock conceptualations. These are the escapement and the nonescapement type of clock. The escapement clock is analagous to a biochemical entity at the cellular level of the organism; it survives replication during cell division without losing time. The nonescapement clock is analogous to a signaling mechanism in the organism; it displays the time information received from an unidentified geophysical force. This force is able to penetrate laboratory constant conditions, and the structure of the organisms, into the intracellular region where the clock is located. The force must provide transferable information in periods of 24 and 24.8 hours, and 29.5 and 365 days for the nonescapement clock to display its message to the physiology of the organism.

0.5

SELF-PURIFICATION OF SEA-WATER FROM BACTERIOLOGICAL CONTAMINATION

Van Dijck, P. J., H. Van de Voorde, and G. Reybrouck (Univ. Louvain, Sch. Public Health, Vital Decosterstraat 102, 3000 Leuven, Belgium)
Int. J. Environ. Stud. 5, No. 1, 27-35 (1973)
Aquatic Sciences & Fisheries Abstracts 4, No. 7, 171, Abstract No. 4Q7351M (July 1974)

The survival time of different pathogenic bacteria was determined in seawater under constant conditions. Some pathogens are relatively stable and may develop in seawater. Only Escherichia coli was destroyed more readily in seawater than in physiological saline. The survival time of the other bacteria did not differ in either seawater or saline. The test for water quality evaluation must use organisms other than E. coli as indicators. SW

0.4 (9.6)

Other investigators of the solar day rhythm in organisms found that it persisted under constant conditions in the laboratory, with slight modification. These workers gave the name "circadian" to the property to denote daily periods which may differ from 24 hours by not more than a few hours. The word circadian is from the Latin "circa" (about) and "diem" (day). Twenty-four hour rhythms that do not persist under controlled conditions do not come under the circadian definition; instead, they belong in the field of ecology because the rhythms are controlled directly by the environment such as the intensity of light relative to the day-night cycle. The term circadian has been incorrectly used in the literature to describe any 24-hour rhythm in an organism without testing its persistence under laboratory constant conditions.

The book is mainly about organisms influenced by the tidal rhythm (circatidal) and consists of 10 chapters, a glossary, an author index, and a subject index. SW

0.4 (9.19)

50-1,000 p/m, there was a reduction of hatched eggs compared to control solutions. One detergent, with a long biodegradation time, had two modes of action: at low concentrations it was toxic; at high concentrations it lowered surface tension and caused drowning of the larvae. In tests on the guppy, irreversible damage to the gill epithelium occurred and a reversible paralyzing effect occurred in solutions containing short and branched chain nonionic detergents. The fish could adapt to the paralyzing effect by exposing them gradually to higher concentrations of the detergents in solution. In the snail, concentrations of detergents as low as 1 p/m caused 100% death in 24 hours. Anion active and nonionic detergents were equally effective. The snails survived if they were placed in freshwater after 20 hours of exposure to the detergent solutions.

The biodegradation products of the detergents had no effect on the viability of the eggs and larvae of the mosquito; the biodegradation products also had no effect on the mortality rates of the fish and snail.

[2 figures, 7 tables, 9 references] SW

0.5 (9.16)

ENVIRONMENTAL ASPECTS OF VIBRIOSIS IN SALMONID AQUACULTURE

Didier, Aloysius J., Jr.

Thesis submitted in partial fulfillment of the requirements for the degree Master of Science, University of Washington, Seattle, Wash. (1974), 48 pp.

The halophilic bacterium Vibrio anguillarum can produce a severe hemorrhagic septicemia in marine poikilotherms (cold-blooded animals). In acute outbreaks under marine aquaculture conditions, losses of salmonids may be as high as 50% in 4 days. The problem of vibriosis is of major economic concern in the culture of salmonids. Prevention of vibriosis is preferable to treatment for the infection. Vibriosis is an infection due to an opportunistic invasion in response to injury or stress of the fish, and the avoidance of conditions causing injury or stress is suggested in the prevention of the disease. Other investigators have reported that members of the genus Vibrio are a frequent component of the marine bacterial flora.

Bacterial populations in water, plankton, and fouling material near a marine salmonid aquaculture installation were monitored. Isolates similar to V. anguillarum were compared to isolates obtained from dying fish involved in vibriosis outbreaks. Only one of four Vibrio isolates was pathogenic to salmonids. No correlation was found between vibriosis outbreaks and frequency of vibrioid organisms in environmental sources. However, stresses produced by elevated water temperatures were shown to be significant factors in initiating outbreaks of vibriosis. In biochemical studies of known strains of Vibrio and environmental isolates, no pattern of biochemical characteristics could be observed which would be useful in consistently identifying virulent strains. SW

0.5

Critical control points in food processing should be given strict attention. In uncooked products, the critical control point for such processes is handling of the product by workers. Pathogenic organisms introduced by workers can be a cause of an outbreak. Other products in which hygiene among workers and sanitary equipment is necessary are cream-filled pastry, cooked meat, milk, cooked poultry, and salads. Heat processing is a critical control point in the processing of meat, eggs, smoked fish, cream-filled bakery goods, milk products, low acid canned goods, and egg-containing supplements. Raw meat before processing is frequently contaminated with pathogens; critical control points in these products are related to handling and cross contamination before and after processing.

An extensive table in the article covers outbreaks involving processing plants and lists the diseases, foods incriminated, type of process, and the literature source. Other tables cover factors contributing to outbreaks. The outbreaks are listed by disease and industry, and the factors include: type of contamination; heat process failure; post process contamination caused by raw products, equipment, cross contamination, workers, and cooling water; factors permitting growth such as inadequate refrigeration, and fermentation; anerobic packaging; and evidence of growth following shipment from the plant.

Officials in the food industry and regulatory agencies should specify critical control points in a process, devise preventive and control measures, set priorities to carry out these objectives, train the staff, and inform consumers of the hazards involved in foodborne infections.

[6 tables, 93 references] SW

0.5
(9.11)

EFFECT OF THE OCEAN ENVIRONMENT ON MICROBIAL ACTIVITIES

Colwell, R. R. (University of Maryland, College Park, Md.), and R. Y. Morita (editors) University Park Press, Chamber of Commerce Bldg., Baltimore, MD 21202 (1974), xiv + 587 pp.

This book contains the Proceedings of the Second United States-Japan Conference on Marine Microbiology at the University of Maryland, August 25-30, 1972.

Although the organisms primarily responsible for degradation of organic compounds in the sea are bacteria, marine microbiology has been neglected and the number of people working in this field is not great. The purpose of the conference was to identify areas that were deficient in the knowledge of marine microbiology and to indicate problems requiring attention by workers in the field.

The proceedings in the book are grouped under five major topics. The first is on salinity effects and interactions with bacteria. The second topic is on temperature and its effects; and the third is on pressure effects. The fourth topic is on the effects of nutrients in the ocean, and the final topic is on microbial interactions. A list of contributors and their affliations is provided, and a subject index is included. SW

0.7

NUTRIENT LOSSES IN INSTITUTIONAL FOOD HANDLING

Head, Mary K. (Dept. of Food Science, North Carolina State University, Raleigh, N.C.) Journal of the American Dietetic Association 65, No. 4, 423-427 (Oct. 1974)

The purpose of this study was to determine nutrient losses in foods during their preparation, distribution, and serving in school kitchens. The work was carried out in two phases. In the first phase, losses of nutrients occurring during transportation of foods in insulated carts was measured on composites of foods taken at the beginning and at the end of transport. In the second phase, nutrient losses from individual menu items were determined by measuring the level of nutrients before and after preparation and during service.

During two 5-day periods, hot and cold foods were sampled as they were being assembled for distribution from a commissary and sampled again during luncheon service at six schools served by the commissary. The foods were transported in insulated carts. Ascorbic acid, thiamin, iron, calcium, and riboflavin were determined on the foods. Results from one 5-day period indicated significant loss of ascorbic acid from the hot foods between the time the hot foods were loaded at the commissary and the time of serving. During one sampling period, there was a significant loss of thiamin from the cold foods. The changes in levels of iron in the samples during transportation and holding were not statistically significant.

Samples of foods were collected at eight schools using the same menus, food brands, and food suppliers. The selected foods were sampled before preparation, immediately on completion of preparation, and in the middle of the servings. Ascorbic acid, thiamin, iron, calcium, and protein levels were determined. Large losses in ascorbic

0.7

ARGININE, LYSINE AND GLYCINE INTERACTION IN THE NUTRITION OF THE CHICK

Kadirvel, R., Pran Vohra, and F. H. Kratzer (Dept. of Avian Sciences, University of California, Davis, CA 95616)
Journal of Nutrition 104, No. 9, 1127-1134 (Sept. 1974)

Previous workers showed that adding an excess of lysine to a casein-gelatin or to a crystalline amino-acid diet depressed growth and produced symptoms of an arginine deficiency in chicks. There appeared to be a possible antagonistic interaction between arginine and lysine. Other work showed that chicks fed ad libitum an amino-acid diet containing an excess of 1% of lysine increased their arginine requirement by 51 percent. Other workers found that the addition of glycine to a casein diet improved the rate gain of chicks. The role of glycine, thus, in overcoming the growth depression induced by an excess of dietary lysine is not clear. In the present study, the researchers explored the role of dietary glycine in the arginine-lysine antagonism for chicks, and the effect of these three amino acids on the excretion of urea, uric acid, and total creatine plus creatinine.

"Lysine caused a greater depression in growth of chicks fed a diet containing casein than a diet containing a combination of safflower meal, corn gluten meal and soybean meal. Glycine, in the presence of arginine, appeared to exhibit a synergistic effect in alleviating the growth depression induced by an excess of lysine. Similarly glycine supplementation decreased nitrogen retention in a diet containing 1% but not 2% lysine. The increased need for arginine and glycine in the diet containing an excess of lysine was not due to an increase in the excretion of creatinine and uric acid.

0.7
(0.4)

DIETARY REQUIREMENTS FOR VITAMIN E AND SELENIUM MEASURED AT THE CELLULAR LEVEL IN THE CHICK

Combs, G. F., Jr., and M. L. Scott (Dept. of Poultry Science and Graduate School of Nutrition, Cornell University, Ithaca, NY 14850)
Journal of Nutrition 104, No. 10, 1292-1296 (Oct. 1974)

Dietary requirements for vitamin E in the presence of adequate selenium, and for selenium in the presence of adequate vitamin E, were determined in vitamin E-depleted chicks fed a semipurified basal diet low in selenium and vitamin E. Inhibition of in vitro ascorbic acid-stimulated peroxidation in hepatic microsomes was used as a parameter. Results showed that both nutrients were required for complete protection of these membranes. Vitamin E was required at 30 to 50 IU per kilogram diet. This level also was required for optimal growth and utilization of dietary vitamin E as plasma tocopherols in selenium-adequate chicks. Selenium was required at 0.06 p/m (as Na_2SeO_3) for inhibition of peroxidation. This level also was required for optimal growth in vitamin E-adequate chicks.
[3 figures, 2 tables, 13 references] Authors' abstract

0.7

The data indicate an interaction among arginine, lysine and glycine in the nutrition of the chicken, and suggest that the presence of glycine limited the growth depression by lysine in the diet containing the plant protein."
[6 Tables, 28 references] FTP

2.03 ENZYMIC ASPECTS OF NUTRITIONAL FLAVOR, AND SANITARY QUALITIES (8.59)(6.71) OF FISH PRODUCTS

Shahani, Khem M. (Coll. Agric., Univ. of Nebraska, Lincoln, Nebr.)
Chemical Abstracts 81, No. 3, 11891q (July 22, 1974)

0.7 (0.4) INFLUENCE OF HIGH LEVELS OF MINERALS ON THE SUSCEPTIBILITY OF CHICKS TO SALMONELLA GALLINARUM

Hill, C. H. (Dearstyne Avian Health Center, Dept. of Poultry Science, North Carolina State University, Raleigh, NC 27607)
Journal of Nutrition 104, No. 10, 1221-1226 (Oct. 1974)

Studies have been conducted on the effect of high dietary levels of several minerals on growth and susceptibility of chicks to Salmonella gallinarum infection using a soybean meal-corn type of of basal diet. Zinc at 2,000 p/m decreased growth, but had no effect on mortality from the infection. Copper at 500 p/m decreased growth, but more was required to increase susceptibility. Cadmium at 40 p/m decreased growth, but more was required to increase susceptibility. Selenium reduced growth at 10 p/m, but susceptibility was increased at 20 p/m. Vanadium at 5 p/m decreased growth and susceptibility was increased at 25 p/m. Mercury at 400 p/m both decreased growth and increased susceptibility. Cobalt at 100 p/m decreased growth, but susceptibility was decreased at 50 p/m. Partial reversal of cobalt and vanadium-induced growth depression by iron and chromium, respectively, was not associated with a change in susceptibility, but partial reversal of cadmium-induced growth depression was associated with a decrease in susceptibility. These results suggest that there is no constant relationship between growth depression and increase in susceptibility to S. gallinarum as manifestations of mineral toxicity.
[13 tables, 7 references] Author's abstract

0.7 (7.67) ANTIOXIDANT EFFECTS ON SELENIUM AND VITAMIN E FUNCTION IN THE CHICK

Combs, G. F., Jr., and M. L. Scott (Dept. of Poultry Science and Graduate School of Nutrition, Cornell University, Ithaca, NY 14850)
Journal of Nutrition 104, No. 10, 1297-1303 (Oct. 1974)

Experiments were conducted to determine the effects of high-level antioxidant feeding on selenium and vitamin E function in vitamin E-depleted chicks fed a semi-purified basal diet low in selenium and tocopherols. Three different antioxidants were fed: ethoxyquin (6-ethoxy-2,2,4-trimethyl-1,2-dihydroquinoline), ascorbic acid and vitamin A. Each antioxidant significantly reduced selenium requirements for growth and prevention of exudative diathesis and mortality in vitamin E-deficient chicks. Also plasma activities of glutathione peroxidase of chicks receiving marginal selenium levels were significantly increased. Ethoxyquin and ascorbic acid treatments reduced the dietary vitamin E requirement for prevention of in vitro ascorbic acid-stimulated peroxidation in hepatic microsomes in selenium-adequate chicks. However, vitamin A treatment severely depressed the plasma concentration of tocopherols and increased microsomal peroxidation without response to dietary vitamin E. The results indicated that antioxidants increased the utilization of dietary selenium without severely affecting vitamin E antioxidant function, except for vitamin A which appeared to antagonize vitamin E absorption directly.
[6 tables, 23 references] Authors' abstract

0.7

acid occurred in most foods between the time before preparation and on completion of preparation. Losses of ascorbic acid in the foods between time of completion of preparation and the middle of serving were minor. The period immediately after opening a can of vegetables appeared to be critical.
[2 tables, 18 references] FTP

0.8 (9.11) TWO APPLICATIONS FOR A DUAL-BEAM TRANSDUCER IN HYDROACOUSTIC FISH ASSESSMENT SYSTEMS

Ehrenberg, John E. (Applied Physics Laboratory, University of Washington, Seattle, WA 98195)
Report No. WSG-TA 74-2, Washington Sea Grant Program, Div. of Marine Resources, University of Washington, Seattle, WA 98195 (Aug. 1974), 4 pp. [Proceedings of Ocean 74 IEEE International Conference on Engineering in the Ocean Environment, Halifax, Nova Scotia, Canada, Aug. 21-23, 1974.]

The use of a narrow and a wide beam acoustic transducer in systems for estimating abundance of fish is described. By this method the acoustic pulse is transmitted with a narrow beam and the echo is received on both the narrow and wide beams. The signals at the two transducers are used to determine the acoustic scattering cross section of the fish. The mean value of the acoustic scattering is used to evaluate the scale factor needed by echo integrators to obtain an absolute abundance estimate. Also, the outputs of the two transducers can be used to control the sampling volume in an echo counting system.
[7 figures, 5 references] FTP

1.0153 (1.0158) ASSESSMENT OF SOUTHEASTERN ALASKA HERRING STOCKS USING HYDROACOUSTICAL TECHNIQUES 1970-71

Moberly, Stanley A. (Div. of Commercial Fisheries, Ketchikan, Alaska), and R. E. Thorne (Fisheries Research Institute, University of Washington, Seattle, Wash.)
Information Leaflet No. 165, State of Alaska, Dept. of Fish and Game, Subport Bldg., Juneau, AK 99801 (Aug. 1974), 24 pp.

Traditionally, fish populations such as herring have been estimated either by tag and recovery programs or from catch per unit of effort data. Both methods involve substantial effort, cost, and voluminous data. Enumeration of fish populations using acoustical techniques offered a less expensive alternative to the other methods. As a result of research conducted at the University of Washington on acoustical techniques for determining fish populations, several types of automatic signal acquisition and processing systems have been developed. The basic data acquisition system developed consisted of a transducer and an echo sounder transceiver; the echo sounder transceiver, through one side of the system, was connected to an interface which was connected to a magnetic tape recorder. The echo sounder transceiver was also connected to an echo sounder recorder. An oscilloscope was connected to the echo sounder transceiver-magnetic tape recorder circuit to allow a single, rapid check of the receiver gain.

Waters south of Petersburg, Alaska were searched by the acoustical system. The results indicated that several acoustical transects across a school of fish are necessary because of the variability of school size estimates. Scattered intermediate size fish targets of unknown species were almost universally present in protected

0.8 HYDRODYNAMIC MODELING OF NETS AND TRAWLS

Christensen, B. A. (Engineering and Industrial Experimental Station, University of Florida, Gainesville, FL 32611)
Proceedings of the 26th Annual Session of the Gulf and Caribbean Fisheries Institute, New Orleans, La., October 1973 (July 1974), pp. 28-35. [Gulf and Caribbean Fisheries Institute, Coral Gables, Fla.]

This paper contains a description of the development and verification of model laws which allow a quantitative evaluation of fishing net and trawl models tested in hydraulic flumes and towing tanks. These model laws are verified by testing net and trawl models of different length scales in the University of Florida's model tank and the corresponding prototypes in the sea. The author indicates that the test model tank will be available on a rental basis to members of the fishing industry to test net designs.
[3 figures, 10 references] FTP

1.0162 (2.12)(2.147) A PROGRAMME TO DEVELOP THE MARINE FISHERIES POTENTIAL OF KENYA AND TANZANIA

Alverson, Dayton L. (Northwest Fisheries Center, National Marine Fisheries Service, NOAA, Seattle, Wash.)
United Nations Development Programme, IOFC/DEV/74/33, Food and Agriculture Organization of the U.N., Rome, Italy (Mar. 1974), vii + 28 pp.

Within Kenya and Tanzania there is an urgent need to increase the production of animal protein for local food supplies and to increase the production of exportable foodstuffs. This need can be satisfied partly by developing the marine fish and shellfish resources of the surrounding waters and by supporting industries based on them. A plan is proposed to prospective donor countries for the development of these resources. The goal of the plan is to increase the production of marine fish and shellfish from the 1971 levels of 7,800 metric tons in Kenya and 22,000 metric tons in Tanzania to 20,000 and 50,000, respectively, in 1980. This will require development of sustained productivity in relation to the economic and social welfare of artisanal fishermen. In addition, exploratory and test fishing, new fishing technology, improvements in processing and distribution facilities, and elevation of product quality must be considered in the program. Local fishermen and technicians will require training so that management of the fisheries can be effectively continued at the end of the development plan. Included in the plan are a followup phase to help finance continued training activities, gear development, vessel acquisition, and other factors beyond their former levels.

1.0119 CATALOG OF COMMERCIAL SPECIES IN THE WESTERN FISHING ZONE OF VENEZUELA

De Espinosa, Victor
Thesis submitted in partial fulfillment of the requirements for the degree of Master of Science, University of Washington, Seattle, Wash. (1974), x + 193 pp.

The distinctive characteristics, size, habitat, feeding and spawning habits, geographical distribution, fishing gear used, and catch statistics of 63 species of fish and three species of shrimp are described. These species are commercially important in the Lake Maracaibo and Gulf of Venezuela waters of western Venezuela. An artificial key to families of the fish is provided in addition to a photograph of each species to assist in identification. SW

1.0162 (2.12)(2.147)

The selection of personnel to assist in the projects is very important. Since the area is tropical, and the fishing villages and coastal locations cannot offer many amenities, persons selected for the project should be dedicated to improving the welfare of the people and capable of working and living under primitive conditions. Patience and understanding are especially desirable qualities for persons who will work on the project. SW

2.1111 POLYCAPRAMIDE FILAMENT

Nishida, Yoshiteru, Michiaki Hagiwara (Unitika Ltd.) (pat.)
Japan. 73 39771 (Nov. 27, 1973)
Chemical Abstracts 81, No. 8, 38863a (Aug. 26, 1974)

0.8 A CORRECTING 'PRISM' FOR UNDERWATER VIEWPORTS

Van Sciver, W. J. (Dept. of Physics and Marine Technology, Lehigh University, Bethlehem, Pa.)
Ocean Eng. 2, No. 5, 223-229 (1973)
Aquatic Sciences & Fisheries Abstracts 4, No. 7, 2, Abstract No. 4Q6530M (July 1974)

The angular field in water viewed by an observer in air depends upon the configuration of the air-water interface. The absolute limit to the field of view is about 46.5° from the normal when the interface is a plane; because of lateral chromatic aberration, the practical limit is about 30°. The conventional port in research submersibles is covered with a sheet of polymethyl methacrylate of uniform thickness and is subject to the same viewing limitations of a plane interface. It is shown that if the surfaces of the port are finished so that they are not parallel to each other, by a previously calculated degree, the observable field of view can be extended to nearly a full hemisphere with acceptably small distortion and lateral chromatic aberrations. SW

1.0153 (1.0158)

areas with depths deeper than 90 m. Typical densities were estimated at about one fish per 100 m^3. A population estimate of 7.6 million fish was made in one location using the acoustical technique. It may be possible to check the acoustical data by surveying a stock before and after an intensive short-term fishery. A comparison between catch and the population estimates from the acoustical surveys before and after the fishery removal may provide a check on their accuracy. SW

2.1111 POLYESTER FIBER

Mitsuishi, Yukio, Namio Domae, Nobuyshio Ochi, and Masataka Fuse (Teijin Ltd.)
Japan 73 39,774 (Nov. 27, 1973)
Chemical Abstracts 81, No. 8, 38864v (Aug. 26, 1974)

1.55 (1.0112) AN EVALUATION OF THE EASTERN BERING SEA FISHERY FOR ALASKA POLLOCK (THERAGRA CHALCOGRAMMA, PALLAS): POPULATION DYNAMICS

Chang, Sukwoo
Dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, University of Washington, Seattle, Wash. (1974), 280 pp.

Over the past 10 to 15 years fleets of Japan and the Soviet Union have developed massive fisheries operations in the Bering Sea, a very productive area for groundfish. Concern has been expressed that the stocks will be depleted and undesirable effects on the total ecosystem will result. The author suggests that the population dynamics of the fish stocks being exploited should be studied for better management of the fishery.

The pollock being fished in the Eastern Bering Sea are considered to be a single stock that makes counterclockwise seasonal movements from the continental slope, over the flats of Bristol Bay, past St. Mathew's Island, and return to the deep slope.

Studies of age groups within the population yielded indications that the recruitment of younger fish into the fishery has increased and is closely related to the smaller length of pollock in recent landings. Furthermore, the population of new recruits in the exploited stock has increased; thus, at least 50-60% of these younger newly recruited pollock have been exploited in the same year that they entered the fishery for the first time. A fairly strong recruitment was observed in 1970 which would support an annual yield of at least 1.5 million metric tons during 1971 and 1972, 2 years in which heavy fishing was exerted.

1.87 (9.3)(9.17) THE LOBSTER FISHERY OF THE MARITIME PROVINCES: ECONOMIC EFFECTS OF REGULATIONS

DeWolf, A. Gordon
Bulletin of the Fisheries Research Board of Canada No. 187, Dept. of the Environment, Fisheries and Marine Service, Ottawa, Canada (1974), ix + 59 pp. [Information Canada, Ottawa K1A 0S9, Canada $3.60]

The most valuable fishery species landed in the Maritime Provinces of Canada is lobster: about $29 million in 1971. The lobster fishery is characterized by low average incomes, a high rate of exploitation, over capitalization, seasonality, and an unchanging technology. Regulations were introduced that prohibit retention of egg bearing females and small lobsters; require licensing of boat operators and registry of boats; restrict fishing for lobster to only part of a year; and restrict the locations where lobsters may be fished. These regulations were considered to promote conservation of the lobsters. An earlier report indicates that the regulations have not affected the yield of lobsters landed; rather, environmental factors such as temperature, bottom terrain, food supply, competition, predation, and disease are the determining factors in the amount of the yield.

A review of the data on the industry indicates that the regulations have led to economic inefficiencies. However, regulations such as limiting the number of traps and limiting the fishery through licensing could lead to increased benefits because of increased returns and greater efficiency.
[20 figures, 17 tables, 122 references] SW

1.7 RESULTS OF EXPERIMENTAL AND EXPLORATORY SHARK FISHING OFF NORTHEASTERN SOUTH AMERICA

Kleijn, L. J. K. (Ossterhoutlaan 6, Haarlem, Holland)
Marine Fisheries Review 36, No. 9, 67-77 (Sept. 1974)

The Caribbean Fishery Development Project (1965-1971) sponsored by United Nations' agencies was responsible for exploratory shark fishing in the area. Present shark fishing in the Caribbean is limited. Prior to the production of synthetic vitamin A, shark fishing on a commercial scale was carried out. The purpose of exploratory fishing for shark was to determine abundance, evaluate fishing methods for shark and teach them to local fishermen, and to provide shark meat for food processing and marketing demonstrations.

Four types of gear were used to explore the shark fishery. The steel cable setline consisted of a 3/8 in diam. cable 3,000-5,000-ft long; at 30-ft intervals, two wire clamps were fastened about 6 in apart. Between the clamps, a 10-ft chain branch line with a Mustad 2½-in shark hook was attached with a snap fastener. The cable is stored on a winch and a marker buoy and a light buoy are attached to both ends of the line. A shark handline consists of a coil (30 fathoms) of tuna longline rope with a buoy, and leaders with tuna hooks attached. A modification of this arrangement was to attach a float to each end of the handline and allow the line to drift horizontally. The Cuban shark longline is shorter than the other longline arrangements to allow it to drift in shallow water.

The bait used for catching shark was mainly fresh fish and shark refuse. When a shark was landed, it was stunned with a mallet, and the tail was immediately cut off to

1.9 PROCEEDINGS OF THE INTERNATIONAL BILLFISH SYMPOSIUM KAILUA-KONA, HAWAII, 9-12 AUGUST 1972. PART 2. REVIEW AND CONTRIBUTED PAPERS

Shomura, Richard S., and Francis Williams (editors)
NOAA Technical Report NMFS SSRF-675 (July 1974), iv + 335 pp. Technical Information Div., D83, Environmental Science Information Center, NOAA, Washington, DC 20235.

The first two papers are reviews of the world commercial fisheries for billfishes and the world sport fisheries for billfish. The world commercial fisheries produce about 100,000 tons annually; Japanese fishermen contribute about 70% of this production. Japan is the principal consumer of these fish. Catch data for billfishes indicate that increased landings of swordfish are being made, blue marlin landings have decreased, and the landings of striped marlin have fluctuated greatly from year to year.

Sport fishing is conducted for billfishes in nearly all warm ocean waters. The principal species caught by sport fishermen, in descending catch rate, are sailfish, white marlin, blue marlin, striped marlin, black marlin, swordfish, and longbill spearfish. Angling for billfish is very often associated with vacations of tourists. The gear used by sport fishermen is relatively inefficient, and the manner of fishing is unlikely to deplete billfish stocks. There is evidence that heavy commercial fishing has reduced the size of billfish caught by sport fishermen. Sport fishing for billfishes has special problems relative to the complexity, expense, expertise required, and the lack of basic information on the fisheries and the fishermen.

The first section of the Proceedings is devoted to the taxonomy and evolution of billfish. Six papers were contributed. The second section covers the biology of the

1.7

bleed the shark while it was fresh and the heart was beating. This lowered the urea level to minimize the possibility of its contaminating the meat. The head, fins, and viscera were also removed; the shark was washed and rinsed and placed on ice in the hold. Large fins were washed and air dried. All other removed parts were cast away.

Steel cable setline was the most productive gear in total catch of sharks. The best depths for catching fish were between 15 and 20 fathoms. The best catches by steel cable were caught in the rainy season, May to August. More than 4,100 sharks of 25 species (yielding 110,000 lb dressed meat) were caught in the operations. The main yield in meat (by weight) came from four species: small tail shark, 11.9%; small blacktip shark, 41.2%; bull shark, 14.4%; and tiger shark, 15.1%. Smalltail shark is most abundant and tough to handle. Blacktip shark provided most of the meat; it is easier to kill, and dressing is easier. The bull sharks are often badly mutilated by other sharks after they are caught. The tiger shark is harder to kill but is easy to dress because of soft cartilage. Handlining was found to be most effective in terms of yield per hour fished.

The author suggests that shark fishing be carried out in conjunction with shrimp trawlers as they discard large quantities of unwanted fish which attract sharks. This arrangement will reduce the necessity for shark fisherman to trawl for bait or chum. [18 figures, 11 tables, 8 references]

SW

1.9

various species of billfishes. The subjects discussed include length-weight relationships, food and feeding habits, maturation and fecundity, parasitism in billfishes, and mercury in billfishes. Thirteen papers were presented in this group. The fourth section deals with distribution of billfishes. The waters in which they are found include Strait of Gibraltar; Cape of Good Hope; San Diego (California); and western North Atlantic, Pacific, and Indian Oceans. Migratory activity is also described. Ten papers were given in this section. The last section contains discussions of the fisheries for billfishes in the Gulf of Mexico; Pacific Ocean and waters off Canada, Hawaii, and Taiwan. Other articles cover fisheries in relation to oceanography. Each article contains a bibliography of literature cited.

SW

1.55 (1.0112)

In an attempt to devise a management strategy for conservation of the pollock in the Eastern Bering Sea fishery, studies of mathematical models yielded information suggesting that mesh size would be an effective regulatory method.

The maximum sustainable yield of 0.9-1.2 million metric tons for the fishery was estimated by determining the relationship between spawners and recruits. The landings in 1971 and 1972 were over 1.5 million metric tons and exceeded the long-term biologically sustainable yield. The author suggests that if the fishing effort continues at this level the Alaska pollock stock in the Eastern Bering Sea will be overfished and depleted.

SW

1.89 [THE ECOLOGICAL CLASSIFICATION OF CEPHALOPODS]
EHKOLOGICHESKAYA KLASSIFIKATSIYA (ZHIZNENNYE FORMY) GOLOVONOGIKH MOLLUSKOV

Nesis, K. N. (Inst. Okeanol. Akad. Nauk SSSR, Moscow, U.S.S.R.)
Itogi Nauk i Tekh. Zool. Bespozvonochnykh 2, 8-59 (1973)
Aquatic Sciences & Fisheries Abstracts 4, No. 7, 48, Abstract No. 4Q6769M (July 1974)

A review is presented of the world literature on the ecology of cephalopods that was published in the years 1960-1970. The ecological groups that are discussed include 5 bottom, 6 nektobenthic, and 12 pelagic. The material presented also provides information on the evolution of cephalopods.

NW

1.89 AMINO ACID COMPOSITION OF OCTOPUS TISSUES

Nasedkina, E. A., A. P. Didenko, and Yu. I. Kas'yanenko (Tikhookean, Nauchno-Issled. Inst. Rybn. Khoz. Okeanogr., Vladivostok, U.S.S.R.)
Chemical Abstracts 81, No. 7, 36606p (Aug. 19, 1974)

1.951 (0.5) HEMOLYTIC ESCHERICHIA COLI AS THE CAUSE OF ACUTE ENTEROTOXEMIA IN A CAPTIVE NORTHERN FUR SEAL

Van Pelt, R. W., and Ohata, C. A. (Institute of Arctic Biology, University of Alaska, Fairbanks, AK 99701)
Veterinary Medicine & Small Animal Clinician 69, No. 10, 1251-1254 (Oct. 1974)

Northern fur seals (Callorhinus ursinus) inhabit the North Pacific Ocean and adjacent seas. They lead a pelagic migratory existence during late fall, winter, and early spring. In the late spring and summer, they return to the breeding grounds on the pribilof and San Miguel Islands in the eastern Pacific and the Commander, Robbins, and Kurile Islands in the western Pacific Ocean. The causes of mortality in these seals at sea include predation, starvation, adverse weather, parasitism, food poisoning, and infectious disease. The highest mortality rate on land occurs in the pups and ranges between 5% and 20%; the causes include malnutrition, trauma, parasitism, gastroenteritis, and infections. Necrotic enteritis is commonly found in the pups, and bacteriological cultures of the small intestine have yielded E. coli, Proteus mirabilis, and Streptococcus faecalis.

A 1-year-old seal was captured at a rookery on St. Paul Island, Alaska, and shipped to a vivarium in Alaska. The seal refused food for 3 weeks and then began to eat smelt. This diet was later replaced with herring supplemented with vitamins; however, there were intermittent periods of vomiting, lassitude, and refusal to eat. About a month after capture, the seal died. Upon post mortem examination, the gastric mucosa were seen to be hyperemic, and there was hemorrhage in the lumen of the colon. No significant lesions were seen in the trachea, esophagus, liver, pancreas, spleen, kidney,

2.116 OCEAN 73. 1973 IEEE INTERNATIONAL CONFERENCE ON ENGINEERING IN THE OCEAN ENVIRONMENT

Anonymous
Institute of Electrical and Electronic Engineers, Inc., 345 E. 47th St., New York, NY 10017 (1973), x + 623 pp. $15.00

The conference was held in Seattle, Wash., September 25-28, 1973. Papers were presented on the following major topics: underwater viewing, oceanographic sensing, signal recording, underwater (human) life support systems, instrumentation in oceanography, acoustics of sonar, buoys and submarine vehicles, sonar hardware, marine sediments, buoy sensing systems, electric and electronic shipboard systems, analysis of sonar systems, marine polar research, monitoring the environment, and positioning and navigation.

The session on acoustic techniques relative to fisheries was devoted to seven papers. The underwater acoustic work of the National Marine Fisheries Service was described in one presentation, and three papers were presented on fish enumeration systems. Two papers contained descriptions of assessment of hake and sockeye salmon, and one paper covered research on the luring of fish by underwater acoustical equipment.

SW

2.00 SOME OBSERVATIONS ON THE HEADING OF PENEUS SHRIMP

Koburger, J. A., R. F. Matthews, and W. E. McCullough (Food Science Dept., University of Florida, Gainesville, FL 32611)
Proceedings of the 26th Annual Session of the Gulf and Caribbean Fisheries Institute, New Orleans, La., October 1973 (July 1974), pp. 144-148. [Gulf and Caribbean Fisheries Institute, Coral Gables, Fla.]

The present commercial practices are to head shrimp before packing the meats (unshelled) in ice, based on the premise that deheaded shrimp keep better in ice than do whole shrimp. This study was carried out to evaluate the keeping quality of whole shrimp held in ice as compared to deheaded shrimp (unshelled shrimp meats) held in ice. The keeping quality was assessed by determination of bacterial counts, total solids, and consumer acceptance. The shrimp were stored for 14 days in ice and examinations were made on the 1st, 7th, and 14th days of storage.

The bacterial counts of both groups of shrimp were about the same, as was the loss of total solids from the shrimp. A taste panel was not able to detect any significant difference in flavor, texture, or overall acceptability between the whole shrimp held in ice and the deheaded shrimp held in ice throughout the 14-day storage period. The results indicate that whole shrimp or deheaded shrimp properly stored in ice will keep equally well.
[3 tables, 11 references]

FTP

2.3 CRUSTACEAN PROCESSING

Lapeyre, J. M. (pat.)
U.S. Patent 3,812,271
Food Technology 28, No. 9, 112 (Sept. 1974)

This process is used to separate the meat from the shell of crustacea. The crustacea are subjected to a vacuum and then to a gas mixture. The gas mixture is ignited causing it to explode and thus to separate the shell.

FTP

2.3 SCALLOP PROCESSING

Martin, R. C., and Edgar E. Griffis (pat.)
U.S. Patent 3,811,148
Food Technology 28, No. 9, 112 (Sept. 1974)

Scallops, in the shell, are exposed to steam to clean them of shell and barnacles.

FTP

2.1124 (1.0119) TRAP FISHING EXPLORATIONS FOR SNAPPER AND RELATED SPECIES IN THE CARIBBEAN AND ADJACENT WATERS

Wolf, Robert S. (National Ocean Survey, NOAA, Rockville, MD 20852), and Geoffrey R. Chislett
Marine Fisheries Review 36, No. 9, 49-61 (Sept. 1974)

The Caribbean fishery development Project (1965-1971) sponsored by United Nations' agencies included exploratory operations using the trap fishing method. The fish traps were set on banks lying south of Jamaica, north of Hispaniola, northern Leeward Islands, off Barbados, and along the continental shelf from Venezuela to French Guiana.

The traps that were investigated included the indigenous West Indian "Z" pot, the Australian "D" pot, the "O" pot, and a pot made to special design. The highest catches made in the Z pot were about 40 lb per lift off the northern Leeward Islands and off French Guiana. The Z pot outfishes the D pot in a ratio of 2:1, and it outfished the other pots tested in a larger ratio. Larger pots and small mesh sizes of the pot netting were characteristic of greater catch rates.

In the Jamaica Banks, grunts, triggerfish, squirrel fish, and porgies predominated in the catch. North of Hispaniola, snappers and groupers contributed about evenly to the catches. About 75% of the catch in the other areas consisted of snappers. The best catches were made in pots soaked for 1 day or less.

There is a good potential for trap fishing in the Caribbean. The deterrent to catching demersal species is the possibility of picking up ciguatera poisoning; however, the silk snapper has been found to be free of ciguatera poison. The article is illustrated with diagrams of the various traps used with details of construction.
[9 figures, 8 tables, 2 references] SW

2.3 (9.19) COLIFORMS IN TREATED AND UNTREATED SALMON-CANNING WASTEWATERS

Strasdine, G. A.
Technical Report No. 462, Dept. of the Environment, Fisheries and Marine Service, Research and Development Directorate, Vancouver Laboratory, Vancouver, British Columbia, Canada (1974), 9 pp.

Wastewater from salmon canning plant operations consists of processing waters from conveying fish and offal, washing, gutting, and cleaning up. The raw wastewater contains high levels of soluble and insoluble organic materials, and it exerts a biochemical oxygen demand on a receiving water system. An experimental wastewater treatment and solids recovery system was installed at a salmon cannery. An investigation was carried out to determine the number and types of coliform organisms present at each stage of the treatment process during the salmon processing season.

The most probable number of coliforms and Pseudomonas aeruginosa were determined in the samples obtained. No increase in the counts of coliforms was observed in the treated water samples. Bacteria were concentrated in the recoverable protein-solids fraction following flotation treatment of raw wastewater. Citrobacter species accounted for 54% of all isolates; Enterobacter, Escherichia, and Klebsiella species accounted for 29%, 9%, and 8%, respectively, of the isolates. Of the bacteria isolated from untreated wastewater, Citrobacter species accounted for 70% of the coliforms. Enterobacter species were the second most prevalent bacteria isolated, and they were isolated with greater frequency in the later stages of wastewater treatment. No Klebsiella species were isolated from untreated wastewater, but they were obtained in all stages of waste water treatment.
[1 table, 9 references] SW

1.951 (0.5)

or urinary bladder. The lymph nodes showed congestion and edema. In the microbiological studies of the organs, a hemolytic strain of E. coli was isolated.

Other reports indicate that immediately following capture most pinnipeds fall into a period of depression and refusal to eat. The resulting physical condition of the seals predisposes them to secondary bacterial infections and complications. Enteropathogenic strains of E. coli are widely distributed in nature and commonly isolated from the intestinal tracts of animals. Enterotoxemia can result from massive proliferation of toxin producing strains of E. coli. Two important factors in this pathogenesis are the immune status of the animal and the ability of a microorganism to invade tissue and produce endotoxin. These factors combined with the stress of prolonged refusal of food appear to have caused the death of the seal.
[4 figures, 10 references] SW

2.12 (1.0119) EXPLORATORY FISHING ACTIVITIES OF THE UNDP/FAO CARIBBEAN FISHERY DEVELOPMENT PROJECT, 1965-1971: A SUMMARY

Wolf, Robert S. (National Ocean Survey, NOAA, Rockville, MD 20852), and Warren P. Rathjen
Marine Fisheries Review 36, No. 9, 1-8 (Sept. 1974)

Three vessels were employed in resource experimentation and exploration in operations that extended from the Central American coastal shelf to the islands and banks off the Greater and Lesser Antilles and to the coastal shelves of eastern Venezuela, Guyana, Surinam, and French Guiana. Gear used in pelagic fishing included longlines, live bait pole and line, trolls, gill nets, lift nets, and handlines; in catching demersal fish, handlines, power reels, traps, longlines, trawls and gill nets were used. About 1 million lb (453,597 kg) of food fish were caught: about 35% consisted of trawl-caught demersal fish; 38% of snapper, jacks, and related species; 17% of sharks, and the remaining 10% consisted mostly of pelagic fish.

The results of the exploratory fishing in the area indicate that the resources are not vast, but several have potential for expansion. The resource with the formost potential is trawling for demersal fishes off the northeastern coast of South America. The second most promising resource is that of snappers, jacks, and groupers. A lesser resource is the potential fishery for sharks off the northeastern coast of South America.
[3 figures, 1 table, 10 references] SW

2.113 HANDLING CORROSION PROBLEMS IN A FLEET OF SMALL CRAFT

Macdonald, W. J. (Fort Brisbane Div., Dep. Harbours Mar., Brisbane, Australia)
Chemical Abstracts 81, No. 10, 53216d (Sept. 9, 1974)

3.12 CHEMICAL CHANGES OF FISH MUSCLE DURING PRESERVATION WITH AMMONIA

Mandal, Sunil K., and Sankar K. Mukherjee (Dept. of Food Technology and Biochemical Engineering, Jadavpur University, Calcutta-700032, India)
Journal of Agricultural and Food Chemistry 22, No. 5, 832-835 (Sept.-Oct. 1974)

In the tropics, freshwater fish spoil readily. Earlier work [Subrahmanyan, V., N. L. Lahiry, M. N. Moorjani, R. B. Nair, and M. A. Krishnaswami, Science 142, 233 (1963)] indicated that ammonia could be used for the preservation of eviscerated oil sardines, and a patent has been issued for the use of ammonia sprays to preserve fish [U.S. Patent 3,442,661]. In the present study, the researchers explored further the use of ammonia for the preservation of the small (100 g each) freshwater Mrigal fish. The ammonia was applied to the fish by various combinations of methods involving dipping, spraying, and holding the fish over a solution of ammonia in water. The levels of ammonia used in the dips were 0.05, 0.1, 0.25, and 0.5 N; the levels of ammonia used for spraying the fish were 0.5, 2, and 5 N; and the levels of ammonia used in airtight containers holding the fish were 0.5, 1, 2, 2.5, and 5 N. Samples were stored at 4°-6° C and at 28°-30° C.

The freshwater Mrigal fish, stored in closed containers over aqueous ammonia [1 ml liquid NH_3 (5 N)/100 g of fish] kept without spoiling for over 3 months at 4°-6° C; the control (untreated) and iced fish samples remained edible only for 6 and 13 days, respectively. The Mrigal fish sprayed with 5 N ammonia and then stored in

4.11 (9.6) NEW METHODS

Newman, H. A. I., and Janet Chow
Journal of Lipid Research 15, No. 5, 533-534 (Sept. 1974)

A listing is given of pertinent references to analytical lipid methods published recently. The list contains 38 references. FTP

4.60 HEMOGLOBIN PEROXIDATION TEST SCREENS ANTIOXIDANTS

Cort, William M. (Product Development Dept., Hoffmann-La Roche Inc., Nutley, NJ 07110)
Food Technology 28, No. 10, 60, 62-66 (Oct. 1974)

This test is designed to screen compounds for their antioxidant activity. In this procedure, hemoglobin is used to peroxidize a 10% safflower oil in water emulsion: the removal of oxygen from the emulsion is measured with an oxygen analyzer. When no antioxidants are used, all the oxygen is removed within 1½ min. When an antioxidant is added, oxygen removal takes 5-10 min. The report contains a description of the procedure and presents results of tests on various chemicals and on natural materials (spices).
[7 figures, 8 tables, 20 references] FTP

3.4 FOOD SMOKING APPARATUS

Deutscher, L. (pat.)
German Patent 2,245,630
Food Technology 28, No. 10, 115 (Oct. 1974)

The patent covers the construction of an easily assembled lightweight kiln for smoking meat. [Copy of this patent, in its original language, may be purchased from L. Janowski, Patteck Industries, P.O. Box 121, Prudential Center, Boston, MA 02199. Price $2.50] FTP

3.4 CUTTLEFISH PROCESSING

Horii, J. (pat.)
Japanese Patent 74 20507
Food Technology 28, No. 10, 110 (Oct. 1974)

The meat of cuttlefish is soaked in a mixture containing sorbitol, α-starch, and carboxymethylcellulose. The cuttlefish meat is then smoked and filled with a food paste mixture. [Copy of this patent, in its original language, may be purchased from L. Janowski, Patteck Industries, P.O. Box 121, Prudential Center, Boston, MA 02199. Price $2.50] FTP

4.80 (0.6) UTILIZATION OF FISH OIL BY CANDIDA LIPOLYTICA AND GEOTRICHUM CANDIDUM . I. BASAL CONDITIONS

Hottinger, H. H., T. Richardson, C. H. Amundson, and D. A. Stuiber (Dept. of Food Science, University of Wisconsin, Madison, WI 53706)
Journal of Milk and Food Technology 37, No. 9, 463-468 (Sept. 1974)

Because of the growing shortage of protein supply, this study on the utilization of fish oil as a raw material for protein production was initiated. This paper and two subsequent papers (one in press and the second in preparation) describe the growth of C. lipolytica and G. candidum on alewife fish (Alosa pseudoharengus) oil. The test growth media contained fish oil; $(NH_4)_2SO_4$, KH_2PO_4, and $MgSO_4$; fish stickwater; and distilled water. Adjustments were made in this growth media to test the effect of supplements (yeast extract, fish stickwater, cornsteep liquor) on the growth of the organisms. Other variables considered were the pH of the growth medium and the level of fish oil. The fish oil was oxidized in shake flasks maintained at 30° C.

Fish stickwater was as effective a growth supplement as was yeast extract or cornsteep liquor. Maximum yields of cells of both organisms were obtained when the pH was between 7.5-8.2 (the pH range tested was from 3.0 to 8.8). The maximum uptake of nitrogen per gram of cells (both organisms) was greater during the first 11 hours of oil oxidation, after which the rate of uptake declined. The increase in cell yield as related to fish oil level (the levels were varied from 0.5% to 10%) stopped for both organisms at the 5% oil level. When 5-10% oil levels in the growth media were used, the pH of the media decreased below the optimal range after 22 hours of incubation without

4.11 DETERMINATION OF DOCOSENOIC ACIDS IN FATS AND OILS BY GAS-LIQUID CHROMATOGRAPHY

Conacher, Henry B. S., and Rajinder K. Chadha (Food Research Laboratories, Health and Welfare Canada, Ottawa, Ontario, Canada K1A 0L2)
Journal of the Association of Official Analytical Chemists 57, No. 5, 1161-1164 (Sept. 1974)

Docosenoic acids are derived from rapeseed and marine oils and thus can be found in Canadian foods such as margarines, shortenings, and salad oils. The government of Canada recently requested food manufacturers to limit the amount of docosenoic acids to ≤5% of the total fatty acids in these foods. The researchers, therefore, developed a rapid gas-liquid chromatographic (GLC) method for the determination of docosenoic acids in fats and oils. The procedure requires about 20 min for analysis and the measurement of only two peaks.

The GLC procedure involves the conversion of a known weight of oil to methyl esters using sodium methoxide-methanol, with a known weight of methyl tetracosanoate used as a standard. After acidification of the esters, they are extracted into hexane and analyzed by GLC on a diethylene glycol succinate column. The percentage of docosenoic acids is determined from the docosenoic acids and internal standard peak areas. Low levels (< 5%) of docosenoic acids can be determined by this procedure.
[1 figure, 3 tables, 4 references]

FTP

4.80 (0.6)

significantly greater production of cells than in media with 1.0% and 2.5% oil. After 33 hours the media with the high fish oil levels dropped to a level where growth of the organisms was inhibited.
[8 figures, 3 tables, 28 references]

FTP

4.86 EFFECT OF TITANIUM-ZIRCONIUM TANNING ON THE POROUS STRUCTURE AND PROPERTIES OF CHEVRETTE

Artamonov, V. B., V. S. Nabokov, A. I. Metelkin, and T. D. Kopaleishvili (2-nd Med. Inst., Moscow, U.S.S.R.)
Chemical Abstracts 80, No. 24, 134952x (June 17, 1974)

3.12

airtight containers kept for 1 month at 28°-30° C; the control (untreated) was spoiled in 1 day. Organoleptic tests were used to determine the acceptability of increased shelf life.
[5 tables, 29 references]

FTP

3.19 (0.5) IRRADIATION PRESERVATION OF FISH MEAT JELLY PRODUCTS. II. CLASSIFICATION OF SPOILAGE BACTERIA IN IRRADIATED KAMABOKO

Sasayama, Shigeyuki
Bulletin of Tokai Regional Fisheries Research Laboratory No. 75, 39-46 (Oct. 1973) [In Japanese]

Kamaboko samples were packed and sealed in cellophane-coated polyvinylchloride film, and irradiated with doses of 100, 300, and 500 krad. All samples were stored at 15° C after irradiation. Control samples were examined for their bacterial flora after 4 days. The irradiated samples were examined as follows: 100 krad,after 6 days; 300 krad, 23 days; and 500 krad, 34 days. Bacteria were isolated from the samples and examined for morphological, physiological, and biochemical characteristics.

From the control kamaboko, rods of the genera Pseudomonas, Flavobacterium, Corynebacterium, Lactobacillus, and Bacillus, and cocci of the genera Micrococcus and Staphylococcus, were isolated. Samples of kamaboko irradiated at 100 krad contained genera that were similar to the control samples. The genera of bacteria isolated from samples irradiated at 300 krad were Corynebacterium and Bacillus. Bacillus species were the only bacteria isolated from samples irradiated at 500 krad.
[1 figure, 5 tables, 8 references] SW

4.61 (4.13) ANTIOXIDANT AND PROCESSING TREATMENTS TO PREVENT RANCIDITY IN MULLET

Orthoefer, F. T. (Dept. of Food Science, University of Florida, Gainesville, FL 32611)
Proceedings of the 26th Annual Session of the Gulf and Caribbean Fisheries Institute, New Orleans, La., October 1973 (July 1974), pp. 48-53. [Gulf and Caribbean Fisheries Institute, Coral Gables, Fla.]

The purpose of this study was to (1) determine the lipid composition of mullet in order to establish the relationship between lipid composition and development of rancidity and (2) examine the effects of antioxidant treatments and processing modifications on extending the storage stability of the mullet flesh. The mullet were obtained from waters off the west coast of Florida. Skinned fillets were prepared from the fish, and they were treated with the test antioxidant, sodium ascorbate. For each treatment, the fillets were dipped into solutions of sodium ascorbate, and then the treated fillets and control samples were wrapped in aluminum foil and stored at 1° C. The thiobarbituric acid number (TBA) was used as a relative measure of the degree of rancidity developed by the fillets.

Data are given on the fatty acid composition of the neutral lipids of the mullet. Based on the degree of polyunsaturation, it appears that the lipids of mullet should possess a degree of stability towards oxidation as might be expected from lipids of other commercial species of fish. The fat content of the flesh of the mullet was as follows: whole fillet, 7.73%; white flesh, 3.72%; and dark flesh, 10.08%. A sodium ascorbate dip (0.2%) was effective in preventing the development of rancidity in mullet fillets stored at 1° C.
[2 figures, 3 tables, 14 references]

FTP

6.15 COMPOSITION CONTAINING PROTEINS

Bosund, Sven I. W., and Bengt L. Bengtsson (Societe des Produits Nestle S.A.) (pat.)
French Demande 2,185,363 (Feb. 8, 1974)
Chemical Abstracts 81, No. 7, 36689t (Aug. 19, 1974)

6.15 DRINK CONTAINING PROTEINS (2.06)

Bosund, Sven I. W., Bengt. L. Bengtsson (Societe des Produits Nestle, S.A.) (pat.)
French Demande 2,185,364 (Feb. 8, 1974)
Chemical Abstracts 81, No. 9, 48756a (Sept. 2, 1974)

6.35 NUTRITIONAL QUALITY OF PROCESSED MILK CONTAINING CARRAGEENAN

Tomarelli, Rudolph M., Walter D. Tucker, Jr., Linda M. Bauman, Savini Savini, and John R. Weaber (Wyeth Labs., Inc., Radnow, PA 19087)
Journal of Agricultural and Food Chemistry 22, No. 5, 819-824 (Sept.-Oct. 1974)

The purpose of this study was (1) to determine the biological properties of carrageenan that had been exposed to the heat treatment of canned milk sterilization and (2) to determine if the presence of carrageenan in the sterilized milk had any influence on the nutritional quality of the milk. Carrageenan is the name for a group of sulfated polygalactans of high molecular weight present in certain seaweeds, principally the alga Chondrus crispus (Irish moss). The product is used to prevent separation in aseptically canned and sterilized milk products, to suspend cocoa particles in chocolate drinks, to prevent whey separation and ice crystal formation in ice cream, and to stabilize whipped products. The nutritional studies were carried out on Sprague-Dawley rats. The animals were fed diets containing carrageenan that had been mixed into skim milk (in the proportion of 1 part carrageenan to 1 part protein) and heat sterilized under the commercial conditions used for canned liquid milk. For the study on the nutritive value of the protein, the ratio of carrageenan to protein in the processed preparation was set at 4/10 so that diets could be prepared that contained 10% protein and 4% carrageenan.

Carrageenan in heat sterilized skim milk produced no observable deleterious effects when fed to rats from the age of weaning to maturity. When fed in a simulated milk powder diet, the processed carrageenan (dietary level of 4%) had no influence (compared to cerelose or cellulose) on the growth rate; diet energy efficiency; absorption of protein, fat, or calcium; blood coagulability; utilization of protein for

7.42 (9.19) ATOMIC ABSORPTION DETERMINATION OF MERCURY IN FISH USING THE COLEMAN MAS-50 MERCURY ANALYZER

Kivalo, Pekka, Asko Visapää, and Runar Bäckman (Chemical Laboratory, Technical Research Centre of Finland, 02150 Otaniemi, Finland)
Analytical Chemistry 46, No. 12, 1814-1817 (Oct. 1974)

To find an alternative to the time consuming and costly neutron activation analysis procedure in mercury determinations, the suitability of the MAS-50 analyzer was investigated.

The reproducibility and accuracy of the instrument was determined using three levels of mercury, as mercuric chloride, without acid digestion. The levels of mercury tested were 0.50, 1.00, and 1.50 p/m; the mean levels determined by the instrument were 0.50, 1.00, and 1.50 p/m, respectively.

The acid digestion procedure described in the applications data sheet (that comes with the instrument) was investigated in comparison with the neutron activation analysis method. Fish samples were analyzed for mercury using the MAS-50; the results indicated that mercury contents of the same fish samples were 30% to 70% of those determined by neutron activation analyses. The authors suggested that the acid digestion procedures in the applications data sheet were unsatisfactory. Trials were made of other acid digestion procedures in which acids, proportions of acids, temperatures, and reaction times were varied to determine the best modification for use with the MAS-50. A procedure by E. Hasanen [Suom. Kemistilehti 43B 251 (1970)] gave the best results with the following modification. An homogenized fish sample of about 1 g (determined to ±0.01 g) is placed in the bottom of a 50 ml round bottom flask with a ground glass

7.461 (3.4) DETERMINATION OF SODIUM CHLORIDE IN SMOKED FISH BY USE OF A SODIUM ION ELECTRODE

McNerney, Francis G. (Food and Drug Administration, U.S. Dept. of Health, Education, and Welfare, 599 Delaware Ave., Buffalo, NY 14202)
Journal of the Association of Official Analytical Chemists 57, No. 5, 1159-1160 (Sept. 1974)

A method is described for the use of a sodium ion electrode to rapidly and accurately determine the salt content of smoked fish. The Code of Federal Regulations [Chapter 21,128a.7(c)(4), (1973)] requires that smoked fish contain 3.5% or 5.0% of salt, expressed as percent in the waterphase of the muscle, depending upon the heat processing procedure used. The Volhard titration method is the official method for determining salt in fish, but, alternatively, flame emission or flame absorption photometry may be used. Both of these official methods require a lengthy digestion step. Sodium ion-selective electrodes have been used for the determination of sodium ion in certain natural products (yeast, beer, wine). The author felt that such methods might also be applied to fish. In the present study the salt content of a number of smoked fish products was determined by use of the sodium ion-selective electrode directly on the diluted homogenized fish muscle. The results were compared with those using the official methods. Four samples of fish were tested: chub, whitefish, herring, and finnan haddie. No significant differences were found in the results for salt content of these samples using the sodium ion-electrode and the two official methods. [1 table, 6 references] FTP

6.35

growth (PER); or the utilization of iron (anemic rats). The authors state that the results of these studies support the conclusion that the use of food grade carrageenan in any present or anticipated use level in foods does not constitute a hazard. In addition, these studies gave no evidence that carrageenan in commercially processed milk impairs the nutritional quality of the milk.
[1 figure, 6 tables, 42 references]

FTP

6.34 USE RANGES OF ALGINIC ACID AND ITS DERIVATIVES

Simonsson, Cr., V. Husan, and V. I. Pope (Romania)
Chemical Abstracts 81, No. 6, 27378p (Aug. 12, 1974)

6.54 FISH PROTEIN ISOLATE

Nestlé SA (pat.)
British Patent 1,348,241
Food Technology 28, No. 9, 112 (Sept. 1974)

Flesh material is treated with aqueous alkali at pH 10-12 and temperature of 80°-100° C. The insoluble material is separated from the mixture, and the alkaline solution is desalted and deodorized.

PTP

7.50 THE SEPARATION AND ESTIMATION OF FREE AMINO ACIDS, TRIMETHYLAMINE OXIDE, AND BETAINE IN TISSUES AND BODY FLUIDS OF MARINE INVERTEBRATES

Barnes, H., and J. Blackstock (Dunstaffnage Marine Research Laboratory, Oban, Argyll, Scotland)
Journal of Experimental Marine Biology and Ecology 16, No. 1, 29-45 (Aug. 1974)

As a preliminary study to an extended series of research investigations on the free nitrogenous substances in extracts of some marine invertebrate tissues, the researchers examined some of the analytical methods involved. The separation and estimation of the nitrogenous substances, especially when their composition and stability under experimental circumstances are unknown, are conditions more severe than those involved in the analysis of protein hydrolysates. In this paper, the separation and estimation of amino acids, glutamine, and asparagine using a single column amino-acid autoanalyzer are described. Also, methods are discussed for the estimation of trimethylamine oxide and betaine. Descriptions of the preparation of the samples are given.
[2 figures, 3 tables, 22 references]

FTP

6.34 ANTIVIRUS AGENT CONTAINING ALGAL POLYSACCHARIDES

Tomaru, Keiichi, Susumu Kubo, Yoshihiko Ohkawa, Hiroshi Uchiyama, and Yoshizumi Hayashi (Japan Monopoly Corp.) (pat.)
Japan, 73 18,446 (June 6, 1973)
Chemical Abstracts 81, No. 5, 2228e (Aug 5, 1974)

7.42 (9.19)

joint; 2 ml of fuming nitric acid is added slowly, and then 1 ml of sulfuric acid (d = 1.84) is added. The flask is connected to an Allihn reflux condenser 30-cm long having at its upper end a 15 cm long capillary (0.5-1 mm inner diameter) connected by a ground glass joint to the condenser. The sample must always be covered by the acid mixture. The sample is boiled gently for 30 min; the solution is transferred quantitatively with washing to a biological oxygen demand (BOD) bottle. The volume in the BOD bottle is made up to 100 ml, and potassium permanganate crystals are added with swirling until a pink color persists. The determination is then continued in accordance with the instructions in the applications data sheet of the instrument. By this procedure 0.89 p/m mercury (mean value) was determined in the fish sample; 0.90 p/m was determined by neutron activation analysis. This deviation is considered to be satisfactory.

The authors suggest that when mercury determinations are carried out, care must be taken to ensure that glassware, reagents, and standards are not contaminated. A reagent blank should be tested to confirm the purity of the reagents. When uncontaminated reagents are tested, a typical value found for the reagent blank is 0.01 µg Hg.
[5 tables, 17 references]

SW

7.524 ESTIMATION OF METHIONINE AND CYSTINE IN COMPOUNDED POULTRY RATIONS

Datta, Salil C. (Dept. of Chemistry, University of Kalyani, Kalyani, Nadia, West Bengal, India)
Journal of Agricultural and Food Chemistry 22, No. 5, 867-869 (Sept.-Oct. 1974)

The nutritive value of a food protein depends upon its amino-acid content; thus, the nutritive value of compounded poultry feeds may be determined by analyzing their amino-acid content. The minimum methionine requirement in a balanced diet for chickens is 0.45%, and that for cystine is 0.35%. Because these amino acids are the more deficient nutrients in certain poultry rations, reliable analytical methods for estimating these two amino acids are needed.

A simple method for the estimation of methionine in poultry rations was developed; it involves the use of ascending thin-layer chromatography. The separated spots are sprayed with ninhydrin and the color is read by use of a spectrophotometer. Cystine was estimated as cysteic acid using the column chromatographic method of E. Schram, S. Moore, and E. J. Bigwood [Biochem. J. 57, 33 (1954)]. The procedure is based on the performic acid oxidation of cystine followed by ion-exchange chromatography.
[2 figures, 4 tables, 11 references] FTP

7.66 DUODENAL CALCIUM BINDING PROTEIN IN THE CHICK: A NEW BIOASSAY FOR VITAMIN D

Bar, Arie, and Robert H. Wasserman (Dept. of Physical Biology, New York State Veterinary College, Cornell University, Ithaca, NY 14850)
Journal of Nutrition 104, No. 9, 1202-1207 (Sept. 1974)

Because the chemical estimation of vitamin D is often not correlated with the biological potency of the vitamin D source, the activity of the vitamin in foods and various preparations is estimated by bioassay. Bioassays involving animals are tedious, time-consuming, and expensive; thus, during the last 15 years other biological tests were developed in order to increase sensitivity and to achieve more rapid estimation of the vitamin D content. These tests involved the administration of a single dose of vitamin D, and the subsequent measurement of the absorption of calcium in vivo, in situ, or in vitro. The administration of vitamin D to vitamin D-depleted animals induces the formation of an intestinal calcium binding protein (CaBP); the level of CaPB varies with the level of the vitamin D dose over a wide range. In this study, the use of intestinal vitamin D-induced calcium binding protein (CaPB) as the end point in the assay of cholecalciferol activity was studied.

"CaPB formation, determined by recently developed highly sensitive immunoassays, was induced by quite low doses of cholecalciferol. The sensitivity of this bioassay for vitamin D is similar to, if not greater than, those reported for other bioassays. Increasing the vitamin D dose level over a wide range (up to 5000 IU/chick) is associated with a direct increase in the concentration of intestinal CaBP. Over a range of 5 to 125 IU cholecalciferol/chick (by single oral or intramuscular injection), CaPB level

7.8 (8.8) RADIOMETRY AND MICROCALORIMETRY -- TECHNIQUES FOR THE RAPID DETECTION OF FOODBORNE MICROORGANISMS

Lampi, Ranno A., David A. Mikelson (U.S. Army Natick Laboratories, Natick, MA 01760) Durwood B. Rowley, Joseph J. Previte, and Roger E. Wells
Food Technology 28, No. 10, 52, 54, 56, 58 (Oct. 1974)

The standard plate count is one of the most common of the microbiological methods to indicate the quality of certain foods. However, 2 days must elapse (incubation time) before the quality of food can be assessed by this method. The present study was initiated to help develop methods for more rapid assessment of the microbiological quality of foods. Two techniques were explored: radiometry--the measurement of radioactive carbon dioxide evolved during bacterial metabolism, and microcalorimetry--the measurement of minute quantities of heat evolved or absorbed during bacterial metabolism. The operational principles, current apparatus, and capabilities of each concept are described. The researchers are engaged in further studies to determine the reproducibility of each technique and the application of each as a screening process to determine the quality of precooked meats.
[6 figures, 14 references] FTP

8.8 (0.5) SETTING MICROBIOLOGICAL LIMITS IN THE FOOD INDUSTRY

Corlett, Donald A., Jr. (Del Monte Corp., Research Center, Walnut Creek, CA 94598)
Food Technology 28, No. 10, 34, 36-38, 39 (Oct. 1974)

Microbiological testing is used in the food industry to ensure wholesomeness and safety of particularly nonterminally heat-treated foods. These tests may involve the detection of microorganisms of public health significance and/or organisms that in some manner indicate the quality of food. Limits of these organisms in foods must be established so that decisions relating to acceptable and unacceptable numbers in food can be made. In this article, the author reviews the types of microorganisms commonly tested, the significance of their presence, the tests used to detect them, and how the results are used to set microbiological limits.
[4 figures, 3 tables, 18 references] FTP

7.66

is well related to the log dose of cholecalciferol. Similarly, feeding vitamin D-depleted chicks for a week with 80 to 640 IU cholecalciferol/kilogram diet resulted in a linear relationship between the log of cholecalciferol intake and duodenal CaPB levels. These linear relationships make possible the quantitation of the cholecalciferol activity in unknown preparations with reasonable accuracy. Using the CaPB-based bioassay, the cholecalciferol equivalent of two commercially available sources of the vitamin was estimated; the observed values were close to those specified by the manufacture. The cholecalciferol equivalent of a commercial chick diet was also bioassayed."
[4 figures, 4 tables, 20 references]

FTP

7.8 ODOR OF CANNED FISH. I. VOLATILE COMPONENTS FROM THE MUSCLE OF FRESH FISH

Ooyama, Shigenobu (Kagoshima Kenritsu Tanki Daigaku, Kagoshima, Japan)
Chemical Abstracts 91, No. 9, 68661r (Sept. 2, 1979)

7.770 IMPROVED METHOD FOR FAT AND OIL ANALYSES BY A NEW PROCESS OF EXTRACTION

Randall, Edward L. (California Analytical Laboratory, 401 North 16th St., Sacramento, CA 95814)
Journal of the Association of Official Analytical Chemists 57, No. 5, 1165-1168 (Sept. 1974)

Equipment and the method have been developed for the rapid (about 30 min) determination of fat, waxes, and oils in plant and animal tissues. The meat, feed, and grain samples are prepared according to AOAC method 24.001 and 7.002, respectively, [Official Methods of Analyses, 11th ed., AOAC, Washington, D.C. (1970)]. A 2-5 g sample is oven dried and immersed in hot ethyl ether for 10 min. The sample is then raised out of the hot solvent and further extracted and rinsed with solvent condensate for 20 min. A double flow condenser is used in the extraction-rinsing process. The exit tube of the condenser has a jagged, or sawtooth, design providing a rainlike distribution of the condensate over the sample. The ethyl ether is evaporated from the mixture and the residue is weighed. Excellent replication of results was obtained and there was excellent agreement with results obtained by the Soxhlet and Goldfisch extractors. The authors believe that the procedure can be applied to products other than meat, feed, and grain.
[2 figures, 4 tables, 3 references]

FTP

8.8 (9.2) WHO WILL PAY FOR MICROBIOLOGICAL QUALITY STANDARDS?

Greenberg, Richard A., R. Bruce Tompkin, and Robert S. Geister (Swift & Co., R&D Center, 1919 Swift Dr., Oak Brook, IL 60521)
Food Technology 28, No. 10, 48, 50 (Oct. 1974)

Implementation of any federal microbiological quality standards for foods will increase the cost of food for the following reasons: (1) The bacteriological analysis workload will be increased. (2) In order to avoid the possibility that a product will be found out of compliance by the federal government, industry will have to establish action levels far below the requirements of the federal specifications. (3) Sampling times will be increased--questionable lots will have to be resampled. (4) Noncompliance products cannot be sold and represent a loss to the manufacturer. (5) Processing cos's would be increased as a result of placing an artificial barrier to new and/or improved processing. (6) Competition will be reduced or limited because probably only the sophisticated food processors would have the technical capability to cope with such standards.

In lieu of lot microbiological quality standards, the authors recommend an adequate audit system for testing products direct from manufacturing and from the field. This proposed microbiological production standard would be based on a geometric running average, with warning limits and action limits, plus the normal quality and sanitation control by the manufacturer. Such an audit system will give full, low-cost protection to the consumer.

FTP

8. (0.7) U.S. DEPARTMENT OF AGRICULTURE NUTRIENT DATA BANK

Murphy, Elizabeth W., Bernice K. Watt, and Robert Rizek (Consumer and Food Economics Institute, ARS, U.S. Dept. of Agriculture, Hyattsville, MD 20782)
Journal of the Association of Official Analytical Chemists 57, No. 5, 1198-1204 (Sept. 1974)

The U.S. Dept. of Agriculture is developing a Nutrient Data Bank of Foods to serve as an international repository of analytical data on all food and beverage products and their ingredients. This bank will contain information useful to nutritionists food scientists, dietiticans, doctors, and consumers. Also, data from the bank will be used to update future editions of the Agriculture Handbook No. 8, Composition of Foods . . . raw, processed, prepared. When the Nutrient Data Bank is fully operational, it will provide information adequate in scope, detail, and accuracy for use in food labeling.

To help in evaluating data to be included in the Nutrient Data Bank, the authors, in this report, reviewed the analytical methods used in determining minerals. A comparison of methods revealed that results obtained by emission spectroscopy frequently did not agree well with results obtained by other methods. Furthermore, proper calibration and care in making determinations are needed for all analytical methods, especially for emission spectroscopy methods. Also, there is need for more certified reference samples for foods, to be used in establishing the accuracy of analytical procedures.
[2 figures, 1 table, 22 references]

FTP

8.8 (9.3) ROLE OF THE REGULATORY IN SETTING MICROBIOLOGICAL QUALITY STANDARDS

Read, R. B., Jr., and E. F. Baer (U.S. Food and Drug Administration, Washington, DC 20204)
Food Technology 28, No. 10, 42, 44, 46 (Oct. 1974)

Microbiological quality standards for foods involve a complex task that is of concern to the food industry, consumers, and regulatory agencies. The regulatory agencies, the authors indicate, have sole or shared responsibility for (1) establishing a rationale for the setting of microbiological quality standards, (2) developing and identifying a data base for use in establishing a standard, (3) creating, publishing, and revising a proposed standard, (4) enforcing the standard, and (5) updating the standard as appropriate to reflect current technology. The authors believe that through the exercise of these responsibilities, reasonable microbiological quality standards can be established for foods to promote honesty and fair dealing in the interest of the consumer--the basic purpose of all quality standards.
[5 tables]
FTP

9.10 A CHECKLIST OF BRITISH AND IRISH FRESHWATER FISH PARASITES WITH NOTES ON THEIR DISTRIBUTION

Kennedy, C. R. (Dept. of Biological Sciences, University of Exeter, England)
Journal of Fish Biology 6, No. 5, 613-644 (Sept. 1974)

One hundred and sixty-eight species of parasites are listed from 36 species of freshwater fish from Britain and Ireland. Information on their distribution is also given. In addition, a list of hosts and the parasites recorded from them is given. The parasite and host lists were compiled from all the published and unpublished records known to the author.
[148 references]
FTP

9.11 THE OCEAN'S FOOD WEB, A CHANGING PARADIGM

Pomeroy, Lawrence R. (University of Georgia, Athens, GA 30602)
BioScience 24, No. 9, 499-504 (Sept. 1974)

Although the food web of the ocean has been observed for over 100 years, several recent discoveries tend to modify the belief that the food chain extending from diatoms, through copepods, to fishes and whales is the major pathway of the flow of energy. There is new evidence which suggests that a new concept of the ocean's food web is appearing.

Photosynthesis is the best understood biological process in the ocean. One investigator recognizes three regions of differing photosynthetic productivity: the open ocean accounts for 81.5% of primary production; coastal waters over the continental shelves, with 9.9% of the total ocean area, account for 18% of primary production; and the major upwellings, with 0.1% of the total ocean area, accounts for 0.5% of primary production. The most obvious plants in the sea are the seaweeds, but they are not significant primary producers. They account for 10% of the primary production of the ocean. On a planetary scale, phytoplankton are the major producers in the food web. Phytoplankton have been divided into two size groups, net plankton and nannoplankton. The difference is in their size: nannoplankton can pass through the nets of less than 60 µm mesh size. Net plankton form the basis of the established paradigm of the food web. Nannoplankton has been more difficult to study and consequently have been neglected. In spite of this neglect, several studies show that net plankton account for a small fraction of total primary production; instead, nannoplankton account for more than 90% of total photosynthetis. These studies further

9.11 OPTICAL ASPECTS OF OCEANOGRAPHY

Jerlov, N. G., and E. Steemann Nielsen (University of Copenhagen, Denmark) (editors)
Academic Press Inc., 111 Fifth Ave., New York, NY 100003 (1974), xv + 494 pp.

This book is a collection of the papers presented at the Symposium on Optical Aspects of Oceanography held at the Institute of Physical Oceanography in Copehhagen, Denmark, June 19-23, 1972. The papers contain descriptions of recent developments in ocean optics, and they emphasize the application of optics in physical and biological oceanography. The editors suggest that collaboration between biologists and physicists in studies of marine optics is desirable because the multidiscipline approach promotes advances in knowledge on the subject.

There are 19 chapters in the book on the physical and biological aspects of the optical properties of the ocean. Chapters on underwater photography, solar radiation in the upper layers, fluorescence of dissolved organic matter, photosynthesis in algae, light and primary production, studies of marine biological production through spectroscopy, orientation of animals to underwater light, and bioluminscence, may be of interest to students of fishery biology and aquaculture. Each chapter gives a list of references and the book is provided with author and subject indexes. SW

9.11 DIVING INVESTIGATIONS ON BIODETERIORATION BY SEA-URCHINS IN THE ROCKY SUBLITTORAL OF HELGOLAND

Krumbein, W. E. (Biologische Anstalt Helgoland (Meerestation), Helgoland, Federal Republic of Germany), and J. N. C. Van der Pers
Helgoländer Wissenschaftliche Meeresuntersuchungen 26, No. 1, 1-17 (May 1974)

The sublittoral zone of Helgoland at water depths between 8 and 20 m is densely inhabited by the rock boring polychaete (marine worm) Polydora ciliata. The marine worm bores into all types of rock except Triassic gypsum beds and Cretaceous flint layers. The main predator of the marine worm is the sea urchin Echinus esculentus occurring in high densities (1-7 specimens per m^2). To prey on the marine worm, the sea urchin has to scrape away 0.5-1.2 cm of solid rock. At the location of vertical cliffs and well stratified marls and limestones, furrows 30 cm long and 1.5-2.0 cm wide are produced. Rock erosion rates of up to 5 cm^3 per specimen per day for the sea urchin are calculated. Extrapolating the population of the sea urchin in 1973, a population of 2×10^7 to 1×10^8 animals is calculated with an erosion rate of 30,000 tons of rock per annum. This bioerosion, in conjunction with winter storms, causes destruction of rocky sublittoral of the region. The authors suggest that the Helogoland subtidal geological structure is being destroyed by weather and wave action, and the sea urchin-marine worm community is a contributing factor.
[11 figures, 1 table, 23 references]

SW

9.12 (1.9) SEXUAL MATURATION OF JAPANESE EEL AND PRODUCTION OF EEL LARVAE IN THE AQUARIUM

Yamamoto, K., and K. Yamauchi (Faculty of Fisheries, Hokkaido University, Hakodate, Japan)
Nature 251, No. 5472, 220-222 (Sept. 20, 1974)

Little is known about the embryonic development of the eel. In this study, eels were artificially matured in aquaria using hormonal treatment. The fertilized eggs produced were developed in normal seawater to the larval stage. The authors describe the early development of the Japanese eel. The development of the egg from fertilization to hatching took place over a period of 38-45 h in normal seawater at 23° C. The development of the larvae was also observed. By the third day after hatching, the mouth and anus of the larvae were open and the pectoral fins appeared; from the fifth to sixth day, the jaw developed conspicuously with tooth anlagen (early stage of tooth development). On the sixth day, the yolk sac was almost absorbed.
[2 figures, 1 table, 8 references]

FTP

8.8 (0.5) ARE MICROBIOLOGICAL QUALITY STANDARDS WORKABLE?

Yeterian, M., L. Chugg, W. Smith, and C. Coles (General Foods Corp., Technical Center, White Plains, NY 10625)
Food Technology 28, No. 10, 23, 26, 32 (Oct. 1974)

The major food processors use microbiological specifications to monitor raw ingredients and finished products as part of their quality control programs. However, bacterial populations in food products constantly change with time. The bacterial level of stored food products may be considerably different from that of freshly prepared products. Data are given to show that bacteria counts in gelatin, cocoa, and pasta products decrease during their storage at room temperature. Also, the authors present data that show that bacterial counts will vary due to the nonuniformity of microbiological test procedures. The data indicate that information gained on the bacterial condition of samples obtained from retail sites far removed in space and time from the manufacturing plant do not reflect the conditions under which a particular food is produced. The authors conclude that it would be difficult to establish a fixed microbiological level by which the acceptability of a product is determined. Thus, microbiological specifications are invaluable as a measure of good manufacturing practices, but they may be impractical and unworkable as rigid standards of quality.
[6 figures, 1 table, 5 references]

FTP

9.11

suggest that microorganisms are the major consumers of energy in the sea. The author believes that further studies are necessary to determine which are the metabolically important microorganisms and how they fit into the food web.

Other parts of the ocean's food web consist of nonliving particulate organic material which does not come directly from primary production. Nonliving particles of several types are more abundant than living organisms in the sea.

Better strategies for utilizing the productivity of the sea might be devised if the pathways of energy transfer were understood in more detail. Whether the pathways of energy really differ in productive and unproductive regions of the ocean also requires investigation.
[1 figure, 56 references]

SW

9.12 (1.87) WESTERN ROCK LOBSTER REARED TO MATURITY

Chittleborough, R. G. (Western Australia Marine Research Laboratories, CSIRO, P.O. Box 20, North Beach, Western Australia 6020, Australia)
Australian Journal of Marine and Freshwater Research 25, No. 221-225 (Aug. 1974)

A group of western rock lobster (Panulirus longipes cygnus) in their second post larval year was maintained in the laboratory at various temperatures under favorable conditions of food availability. The growth, size, age at maturity and breeding behavior were observed.

Growth of the lobster was more rapid than in the wild population, and resulted in a larger size at maturity. The more favorable conditions in the laboratory did not, however, result in earlier maturity. Ages at first breeding (the clearest indication of maturity) ranged from 4.9 to 5.7 years. In this species there is no necessity for mating to be synchronized with the molting of the female. Spawning occurred a few days after mating in some cases and 2 to 3 weeks later in other cases. Eggs in each batch hatched within a few hours. When the lobsters were held at 25° C, repetitive breeding occurred, in contrast to seasonal breeding in the wild population. Shedding of the shell did not always take place between each breeding cycle, and a fresh mating was required to fertilize each group of eggs to be spawned.
[1 figure, 1 table, 6 references] SW

9.12 THE INFLUENCE OF CERTAIN ENVIRONMENTAL FACTORS ON THE MAXIMUM LENGTH OF THE SCALLOP, PECTEN MAXIMUS L.

Gruffydd, Ll. D. (Marine Science Laboratories, Menai Bridge, Anglesey, United Kingdom)
Journal du Conseil 35, No. 3, 300-302 (June 1974)

Samples of scallops were collected from 43 stations in the North Irish Sea to determine the effect of depth, population density, and sediment type on their maximum length (L_{max}). L_{max} was estimated by calculating the mean lengths of all scallops of 12 years of age and over in a sample. The greatest L_{max} was attained by the scallops where there is the least mud in the sediment and where the population density is lowest. The L_{max} of the scallops is not affected by the depth of the water over the beds.
[2 tables, 11 references] FTP

9.16 AQUACULTURE IN CANADA. THE PRACTICE AND THE PROMISE

MacCrimmon, H. R. (Dept. of Zoology, University of Guelph, Guelph, Ontario, Canada), J. E. Stewart, and J. R. Brett
Bulletin No. 188, Dept. of the Environment, Fisheries and Marine Service, Ottawa, Canada (1974), x + 84 pp. For sale by Information Canada, Ottawa K1A 0S9, Canada

This Bulletin gives a review of the current practices and opportunities in aquaculture in Canada based upon freshwater fisheries, marine fishes, seaweeds, and invertebrates. The first section is devoted to freshwater aquaculture which has existed in Canada for over 100 years. Government hatcheries have provided fish for release into public water, and private hatcheries have provided fish for release in private water. The aquaculture production of fish for human consumption is recent. The extent of government assistance to the industry has not been decided. Inadequate groundwater supplies requires alternatives such as recirculation systems. The market for the aquaculture industry will necessitate advertising and promotion. The increased supplies of trout may cause a lowering of prices. The nutritional requirements of fish must be identified. Fish genetics and strain selection studies are necessary for better utilization of all the resources of the aquaculture industry.

The second section is given to invertebrates in Canada. Consumption of oysters in Canada exceeds the domestic supply which necessitates importation from foreign producers. The supply of Canadian oysters could be increased by suspended or raft culture which makes for better use of areas favorable to oyster production. There has been a reduction in the area of the limited grounds available for oyster production by diversion to recreational and other uses and by pollution. The oyster industry needs to develop markets, increase the scale of production for economic advantages, and

9.16 (1.32) EFFECTS OF DISCHARGE IN THE CEDAR RIVER ON SOCKEYE SALMON SPAWNING AREA

Graybill, J. Paul
Thesis submitted in partial fulfillment of the requirements for the degree of Master of Science, University of Washington, Seattle, Wash. (1974), v + 60 pp.

The Cedar River water shed is managed by the City of Seattle Water Dept. to supply the Seattle Metropolitan area. The river between the towns of Renton and Landsburg is the primary spawning tributary of the Lake Washington sockeye salmon in addition to lesser amounts of chinook and coho salmon, and steelhead and cutthroat trout.

Investigations were carried out at 11 reaches of the Cedar River to determine the depths and water velocities preferred by spawning salmon and to elucidate the effects of water discharge on spawning during low flow periods. The preferred depths and velocities were found to be 15.2-54.9 m (0.5-1.8 ft) and 28.4-78.9 cm/sec (0.93-2.59 ft/sec), respectively. The capacity of the Cedar River to accommodate spawning sockeye was estimated to be 167,000-367,000 spawners. A method based upon the spawnable area gained or lost is presented for predicting the effects of discharge which deviate from the main peak spawning discharge. The author suggests that the method can be used to resolve the conflict among municipal-industrial, public use, and fishery requirements during low flow periods of the river. SW

9.16
(1.33)

THE EFFECT OF LEACHATE FROM WESTERN RED CEDAR, THUJA PLICATA DONN, ON AQUATIC ORGANISMS

Peters, Greig Bruce
Thesis submitted in partial fulfillment of the requirement for the degree of Master of Science, University of Washington, Seattle, Wash. (1974), xi + 170 pp.

The decline in the commercial salmon fishery of the Quinault Indian Reservation has been attributed to logging operations, in addition to possible overfishing, which has increased as commercial catches decreased. A large proportion of the trees on the reservation consists of western red cedar which contains active fungicidal properties and is associated with poorly drained soils. An investigation was carried out to determine the toxicity of cedar extractives to stream organisms and to determine the growth and survival of coho salmon in streams with different chemical and biological properties.

The most toxic of the cedar compounds are the tropolones. The interaction of various modifying factors with tropolones were investigated. Temperature, iron concentration, and degree of prior exposure of the test organisms had a strong effect on the toxicity of the tropolones. However, the levels of tropolones in the streams tested were not toxic to test organisms. The most acute condition found in the streams of the reservation was high acidity. Lethal conditions of low pH persisted for 6 months or more. The extensive logging on the reservation is believed to be partly responsible for the high acidity of the streams. SW

9.16

MARICULTURE POTENTIALS IN ESTUARINE OIL-PIPELINE CANALS

Kilgen, Ronald H., and Alva H. Harris (Dept. of Biological Sciences, Nicholls State University, Thibodaux, La 70301)
Proceedings of the 26th Annual Session of the Gulf and Caribbean Fisheries Institute, New Orleans, La, October 1973 (July 1974), pp. 75-80. [Gulf and Caribbean Fisheries Institute, Coral Gables, Fla.]

In some oil fields, a network of main channels and connecting canals may run as much as 30 miles within a 6-square mile area. These canals, excavated in estuarine marshes, are for the purpose of oil exploration, drilling, and transportation. The manmade canals can be classified into the following groups: those used for access to oil-well drilling sites, those used for pipeline right-of-way, and those used for oil-logistic support vessels and the movement of petroleum barges. Unplanned or poorly planned canal dredging operations may result in direct destruction of valuable marsh areas.

Many of the closed-off canals in estuarine areas, however, can be managed to produce annual crops of fish and shellfish of recreational and commercial value. Some canals have produced high standing crops of certain species of fishes, shrimps, and crabs; the most promising venture is that of using cage culture for channel catfish or pompano. By this method of fish culture, problems of predation, flooding of canals, and harvesting are eliminated. The authors suggest that sport fishes, such as speckled trout or red drum, along with forage species could be stocked and managed in some canals. Another combination would involve stocking of shrimp along with cage culture of fish. Further research work is needed to develop appropriate canal fisheries management techniques.
[11 references] FTP

9.12

THE HATCHING PROCESS IN FISH EMBRYOS--IV. THE ENZYMOLOGICAL PROPERTIES OF A HIGHLY PURIFIED ENZYME (CHORIONASE) FROM THE HATCHING FLUID OF THE RAINBOW TROUT, SALMO GAIRDNERI RICH

Hagenmaier, Hans E. (Institute of Zoology, University of Münster, 44 Münster, West Germany)
Comparative Biochemistry and Physiology 49, No. 2B, 313-324 (Oct. 15, 1974)

The eggs of teleosts are enclosed in a chorion that serves as a protective envelope. Just before the eggs hatch, the epidermal gland cells of the embryo secrete a choriolytic enzyme which digests the inner layers of the chorion. The outer layer consists of jelly and is ruptured by the larva itself. In this study, the authors purified a choriolytic enzyme from the eggs of the rainbow trout and determined some if its properties. The hatching enzyme was isolated from the hatching fluid after stimulating the still-encased larvae with dissolved nitrogen. Purification of the enzyme was carried out by gel filtration on Sephadex G-75 and exchange chromatography on DEAE-cellulose. The enzyme, after gel filtration, was stable for 4 days at 25° C at an optimum pH of 8.5. The enzyme chorionase showed no activity on the amino-acid substrates N-benzoylarginine ethylester, N-benzoyltyrosine ethylester, N-acetylphenylalanine naphthylester, and N-benzoylarginine naphthylamide. The enzyme belongs to the metallo-proteases. The molecular weight, calculated by gel filtration, was 10,000.
[6 figures, 3 tables, 24 references] FTP

9.16

improve quality control of the product. Other investigations are being carried out in the aquaculture of Atlantic oysters, mussels, lobster, crayfish, and littleneck or cherrystone clams. In the area of seaweeds, there is a stable market in the United States for reliable supplies. Investigations are in progress to determine whether Chondrus crispus and species of Gracilaria can be cultured at a profit to increase the supplies of the raw material required in the production of carrageenan and agar. Nutrition, disease, and culture techniques of the various species are also discussed.

The third section covers marine fish in Canadian aquaculture. Aquaculture production of marine fish has been successful in Japan, Norway, the Philippines, Indonesia, Taiwan, and the United States. Canadian attempts in marine fish aquaculture have not been successful. There is a substantial basis for developing Pacific salmon aquaculture in the waters of Georgia Strait of British Columbia. The author suggests that an experimental fish farm should be established by the government to develop a resource for technical development, economic assessment, information service, demonstration training, and expert advice. The experiments should be conducted at more than one site and with more than one species. Chum and coho salmon are well suited for aquaculture because of ease of breeding and rearing and rapid growth. These fishes should be selected for experimental farming in Canadian coastal waters in floating fish pens. The development of nutritious, inexpensive fish food is a critical necessity for successful aquaculture of fish.
[48 references] SW

9.16 METHOD OF CULTIVATING MOLLUSKS

Moeller, Henry W. (45 St. Andrews Rd., South Hampton, N.Y.) (pat.)
U.S. Patent 3,811,411
Official Gazette of the U.S. Patent Office 922, No. 3, 744-745 (May 21, 1974)

The mollusks are cultivated by enclosing the seed mollusks inside a tube of netting material. The resulting material is then immersed into the growth-inducing environment FTP

9.17 (1.0112) A STUDY OF FOUR MAJOR GROUNDFISH FISHERIES OF THE BERING SEA

Low, Loh Lee
Dissertation submitted in partial fulfillment of the requirement for the degree of Doctor of Philosophy, University of Washington, Seattle, Wash. (1974), 241 pp.

The species making up the Bering Sea groundfish fishery are yellowfin sole, Pacific cod, Alaska pollock, and Pacific ocean perch. Detailed catch and fishing effort statistics have been maintained by the Japanese in their commercial fishing operations in this fishery. This information was analyzed to determine trends in stock abundance, potential yields, and status of the exploited species. The analysis is presented in three parts. The first part is a pictorial presentation of the catch data in three-dimensional graphs yielded by a computer-generated graphic procedure. These graphs show that yellowfin sole was caught mainly in the eastern Bering Sea, Pacific cod and Alaska pollock were taken along the outer continental shelf, and the Pacific ocean perch was fished along the Aleutian Islands and the outer continental slope. The graphs provided information on species catches by gear type, by month, in statistical areas as small as 30 miles square.

The second part of the analysis is an evaluation of the status of the resource. Indices based on catch per unit of effort values were used to estimate population biomass in 1970-71 and potential yield. The estimates for yellowin sole was 1,017 thousand metric tons (TMT); cod, 802 TMT; pollock, 5,167 TMT; and perch, 276 TMT. Maximum sustainable yield, estimated from production models, for these species was 117, 58, 1,111, and 12 TMT, respectively. The author suggests that yellowfin sole and perch

9.19 MERCURY AND SELECTED PESTICIDE LEVELS IN FISH AND WILDLIFE OF UTAH: I. LEVELS OF MERCURY, DDT, DDE, DIELDRIN AND PCB IN FISH

Smith, F. A., R. P. Sharma, R. I. Lynn, and J. B. Low (Utah State University, Logan, UT 84322)
Bulletin of Environmental Contamination and Toxicology 12, No. 2, 218-223 (Aug. 1974)

The purpose of this study was to obtain information on levels of mercury (and pesticides) in fish and wildlife being consumed by sportsmen. Eleven different species of fish were examined. The areas sampled were Willard Bay Reservoir, Utah Lake, Deer Creek Reservoir, Bear Lake, Ogden Bay, and Farmington Bay. The levels of mercury in the muscle tissue of most of the fish were generally lower than the guideline limit of 0.5 p/m except those fish from the Willard Bay Reservoir. The predator species of fish showed the greater accumulation of mercury. Only small amounts of the pesticide (DDT, DDE, dieldrin) were found in the muscle of the fish. Because PCB's were detected in the fish, analyses were also made for these compounds; a majority of the fish muscle tissues contained appreciable levels of PCB (range of means from 0.089 to 0.312 p/m).
[2 tables, 9 references] FTP

9.19 TOXICITY OF CHLORINE AND HEAT TO PINK (ONCORHYNCHUS GORBUSCHA) AND CHINOOK SALMON (O. TSHAWYTSCHA)

Stober, Quentin J., and Charles H. Hanson (Fisheries Research Institute, University of Washington, Seattle, WA 98195)
Transactions of the American Fisheries Society 103, No. 3, 569-576 (July 1974)

The combined effects of heat and chlorine were tested on juvenile chinook salmon in a matrix design of five residual chlorine levels (0.05, 0.1, 0.25, 0.5, and 1.0 mg/liter, four exposure times (7.5, 15, 30, and 60 min), and four temperatures at ambient and above ambient (Δt to 0°, 2.6°, 4.9°, and 10.0° C). Juvenile pink salmon were tested at three temperature levels at ambient and above ambient (Δt 0°, 5.0°, and 9.9° C). Both species of fish showed decreasing tolerance to residual chlorine with increasing temperature and exposure time. Exposure for 60 min and at 9.9° and 10° C Δt were the most acutely toxic to the salmon. The LC50 (lethal threshold concentration) was 0.045 mg/liter for both species of salmon after exposure to fluctuating chlorine levels (0.05 to 1.0 mg/liter) for 2 hours. The LT50 (median lethal times) took place in about 100 min at about 0.5 mg/liter chlorine levels.
[6 figures, 14 references] FTP

9.17 (1.0112)

are overexploited, and the same status is imminent for the cod. Furthermore, the pollock fishery should be reduced.

The third part of the analysis used a computer-generated simulation model to indicate population inferences. Fishing operations were simulated according to patterns of fish distribution and fishing strategies in order to compare actual population abundance with estimates based on simulated catch and effort information. The results imply that the statistics gathered in the Japanese fishery overestimated catch per unit of effort and biomass for the four species in the Bering Sea fishery. The author suggests that this analysis should be helpful in developing an international management strategy. SW

9.1 TOXICITY OF MIXTURES OF GUINALDINE SULFATE AND MS-222 TO FISH

Dawson, Verdel K., and Leif L. Marking (Bur. Sport Fish. Wild., Fish Wildl. Serv., La Crosse, Wis.)
Chemical Abstracts 81, No. 9, 45926v (Sept. 2, 1974)

9.16 FARMING THE ARTIFICIAL SEA: GROWTH OF CLAMS IN A RECIRCULATING SEAWATER SYSTEM

Hartman, Michael, Charles E. Epifanio, Gary Pruder, and Richard Srna (College of Marine Studies, University of Delaware, Lewes, DE 19958)
Proceedings of the 26th Annual Session of the Gulf and Caribbean Fisheries Institute, New Orleans, La., October 1973 (July 1974), pp. 59-74. [Gulf and Caribbean Fisheries Institute, Coral Gables, Fla.]

This study indicated that the culture of market-size hard clams in recirculating systems is technically possible. Eight experimental groups of hatchery-reared clams were cultured for 22 weeks from setting in a recirculating seawater system. The groups were fed different diets consisting of various combinations of four species of algae. Extrapolating the growth rate values for the fastest growing group indicated a yield of clams with a shell height of 1.6 cm after 1 year. This estimated growth rate is greater than those for clams growing in natural situations.
[12 figures, 3 tables, 26 references] FTP

9.19 (9.3)(9.6) AIR POLLUTION AND THE POLITICS OF CONTROL

Anonymous
MSS Information Corporation, 655 Madison Ave., New York, NY 10021 (1973), 182 pp.

This book is a collection of current research on the toxicity of various air pollutants. Papers on problems of pollution costs, training specialists for pollution control, and government efforts to combat air pollution are also presented. The first major topic covers the toxicity of sulfur oxides, nitrogen oxides, carbon monoxide, and ozone. Five papers are given. The second major topic discussed in the book is the toxicity of particulates in the air. Four papers are given in this part. The last topic covered is on the politics of air pollution control with five papers. The subjects included in this group are on the responses of the Federal government to air pollution, the use of standards in administration of pollution control programs, air pollution control training, and petroleum fuels relative to air pollution. Each article is followed by a bibliography, and an author index is provided. SW

9.19 MERCURY: ENVIRONMENTAL CONSIDERATIONS, PART II

Krenkel, Peter Ashton (Div. of Environmental Planning, Tennessee Valley Authority, Chattanooga, Tenn.)
CRC Critical Reviews in Environmental Control 4, No. 3, 251-339 (1974)

The author stresses, that when environmental contaminants are regulated, there is need for combining concern for the environment, economic impact on the industry, and ever-increasing scientific information. The behavior of mercury and its compounds in natural systems, from chemical reactions in water to phenomena involving the path of mercury species through various soil components, food chains, and to man, is discussed. Some chemical reactions considered are those of metallic mercury compounds which are expected to occur in natural or industrial pollution incidents or in methods of analysis for mercury. Various sediment components, such as sands, clays, organic constituents, minerals, and some synthetic materials, are compared quantitatively for mercury absorption and its variation with changes in pH, chloride content, exposure to oxygen, and other factors. The author discusses the chemistry of the methylation process and the occurrence and path of methylmercury compounds produced, and explores the effects on ecosystems. The physiological and toxicological effects of mercury vapor, inorganic salts, and various organomercurials (aryl-, alkoxyalkyl-, and alkylmercurials) in relation to possibilities of human exposure to the pollutants are discussed. Comparisons are made of ideal characteristics of, and methods for, determining realistic standards and actual values used for standards for levels of mercury in water, industrial air, ambient air, emissions from industries, and foods. A detailed examination is made of possibilities for treating mercury or reducing its content in waste streams and for removing or covering mercury in sediments.
[64 figures, 47 tables, 592 references] FTP

9.19 (0.5) INVESTIGATIONS ON DECOMPOSITION OF LIQUID FUELS BY MARINE ORGANISMS

Maciejowska, Modesta, and Ewa Rakowska
Reports of the Sea Fisheries Institute [Gdynia, Poland] 17A, 181-203 (1973) [In Polish; abstract and summary in English]

The purpose of this study was to determine the importance of microorganisms in the process of fuel oil degradation in the Baltic Sea and to establish the degradation life of the pollutants. The microbiological decomposition of fuel oil is more efficient at low levels of oil in water; agitation also promotes degradation of the oil. The maximum growth of bacteria occurred after 2-3 weeks after incubation (room temperature). The most rapid decomposition of fuel took place during the 4th and 5th weeks, after which the rate of decomposition gradually decreased.
[6 figures, 11 tables, 21 references]

FTP

9.19 (1.83) THE DISTRIBUTION OF HEAVY METALS IN THE RED ABALONE, HALIOTIS RUFESCENS, ON THE CALIFORNIA COAST

Anderlini, Victor (University of California, P.O. Box 247, Bodega Bay, CA 94923)
Archives of Environmental Contamination and Toxicology 2, No. 3, 253-265 (1974)

Other reports indicate that the baseline levels of heavy metals (except lead) in marine ecosystems are derived mainly from natural sources. However, pollution in estuarine and coastal waters containing cadmium, lead, and mercury from local industrial and municipal sources, might increase environmental levels of these metals above the reported baseline. The distribution of eight heavy metals in the red abalone was investigated. Abalones were obtained from five locations on the coast of California which included industrialized and relatively undisturbed areas. Gill, mantle, digestive gland, and foot muscle tissue were dried and ground to a powder. The powdered material was dissolved in several treatments with nitric acid; precautions were taken to prevent contamination. Presence of the metals was determined by atomic absorption spectrophotometry.

The levels of copper in the abalones were within the range found for gastropods by other workers; the levels of copper were higher in abalones taken from the northern locations than in those taken in the southern sites. Levels of silver in the gill, mantle, and digestive gland were about tenfold higher than the levels in the foot tissue. The levels of copper and silver in samples from Long Beach were higher than in samples from other locations and may be due to pollution. Zinc levels were about twofold higher in the digestive gland than in other tissues. The levels were probably related to natural levels at the sites where the samples were taken. Levels of cadmium

9.19 MERCURY IN SEVERAL SPECIES OF BILLFISHES TAKEN OFF HAWAII AND SOUTHERN CALIFORNIA

Shomura, Richard S. (Tiburon Fisheries Laboratory, National Marine Fisheries Service, NOAA Tiburon, CA 94920), and William L. Craig
NOAA Technical Report NMFS SSRF-675, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, Wash. (July 1974), pp. 160-163. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

The results of analyses of the mercury content of 37 blue marlin, Makaira nigricans, 56 striped marlin, Tetrapturus audax, and 3 swordfish, Xiphias gladius, are presented.

The levels of total mercury found in white muscle of blue marlin caught in Hawaiian waters ranged from 0.19 ppm to 7.86 ppm; fish specimens ranged in total weight from 96 pounds (43.5 kg) to 907 pounds (410.9 kg). A trend of increasing mercury level with increasing size of fish was noted. The mercury content in the livers of 26 blue marlin specimens examined ranged from 0.13 ppm to 29.55 ppm; there was no apparent trend noted between mercury content in the liver and size of fish.

Striped marlin from Hawaii and southern California showed a range of mercury levels in white muscle of 0.09-1.09 ppm for the 14 Hawaii samples examined and 0.03-2.1 ppm for the 42 California samples examined. The range in size of fish was 56-139 pounds (25.4-63.0 kg) and 109-231 pounds (49.4-104.8 kg) for the Hawaii and California samples, respectively. From the wide spread of mercury levels encountered in striped marlin, a trend of mercury level with size of fish could not be easily detected. Livers of nine specimens from the Hawaii catch were analyzed; mercury levels ranged from 0.05 ppm to 1.53 ppm.

9.19 MULTIRESIDUE ANALYSIS OF FOURTEEN ORGANOPHOSPHORUS PESTICIDES IN NATURAL WATERS

Ripley, Brian D., Robert J. Wilkinson, and Alfred S. Y. Chau (Canada Center for Inland Waters, P.O. Box 5050, Burlington, Ontario, Canada L7R 4A6)
Journal of the Association of Official Analytical Chemists 57, No. 5, 1033-1042 (Sept. 1974)

A method is described for the determination of 14 organophosphorus pesticides in waters at levels less than 1 µg/l (ppb). The pesticides were phorate, diazinon, disulfoton, ronnel, methyl parathion, malathion, parathion, crufomate, methyl trithion, ethion, carbophenothion, imidan, azinphosmethyl, and azinphosethyl. Two methods of extraction are given: the vortex stirring method for water that forms light emulsions during extraction and the separatory funnel method for water that forms heavy emulsions. Also, two concentration methods are described. The organophosphorus compounds were determined by isothermal gas chromatography using a flame photometric detector that is quantitatively sensitive to phosphorus. For most of the 14 organophosphorus compounds, the method was sensitive to 0.01 ppb using one liter of the water.
[6 figures, 6 tables, 17 references]

FTP

9.19 (1.83)

were up to 1,400 p/m in the digestive gland of the abalone, and these levels were tenfold higher than those in the other tissues. The levels of cadmium were generally similar in samples taken from all locations. Concentrations of nickel were highest in the gills and lowest in the foot muscle of samples from all locations. Variations in nickel levels probably reflect local variations in the water or in food sources. Chromium levels were not detectable in foot muscle, and the levels varied in the other tissues. Lead was not detectable in gill, mantle, and foot muscle tissues. Levels were higher in the digestive gland and ranged from 9 p/m to 40 p/m. Mercury was present in all tissues of the abalone ranging from 0.01 p/m to 0.82 p/m in gill, mantle, and muscle. In the digestive gland mercury levels ranged from 0.09 p/m to 9.32 p/m.
[2 figures, 1 table, 31 references] MS

Wang, Chin-Hwa (Inst. Geol., Acad. Sin., Peking, China)
Chemical Abstracts 81, No. 10, 53954t (Sept. 9, 1974)

9.19 WATER POLLUTION

9.19 AVOIDANCE OF AROCLOR 1254 BY SHRIMP AND FISHES

Hansen, J. D., S. C. Schimmel, and E. Matthews (Gulf Breeze Environmental Research Laboratory, U.S. EPA, Sabine Island, Gulf Breeze, FL 32561)
Bulletin of Environmental Contamination and Toxicology 12, No. 2, 253-256 (Aug. 1974)

The ability of certain shrimp and fishes to avoid Aroclor 1254 was tested in a black plastic apparatus in which the animals could move from a holding area into either a section that contained water with Aroclor 1254 or a section that contained water without the PCB. The following animals were tested: pink shrimp, grass shrimp, pinfish, sheepshead minnows, and mosquitofish. The contaminated test water contained 0.001, 0.01, 1, or 10 mg/l of Aroclor 1254.

Pink shrimp and sheepshead did not avoid any of the levels of PCB tested. Grass shrimp and pinfish avoided the 10 mg/l and the mosquitofish avoided the 0.1, 1, and 10 mg/l levels of the PCB (Aroclor 1254). Apparently some aquatic animals can avoid Aroclor 1254 in laboratory tests. but the possibility of their avoidance of this PCB in an estuary is yet unknown.
[1 table, 11 references] FTP

9.19 TRIALS OF DETERMINATION [OF] THE EFFECT OF POLLUTION ON BOTTOM FAUNA OF LAKES IN SZCZYTNO

Sikorowa, Aleksandra, and Sławomir Wielgosz
Zeszyty Naukowe Akademii Rolniczo-Technicznej w Olsztynie, Ochrona Wód i Rybactwo Śródlądowe No. 3, 95-113 (1974) [In Polish; English abstract] [Agricultural and Technical Academy, Water Conservation and Inland Fisheries, Olsztyn, Poland]

An analysis was made of the qualitative structure and quantity of bottom macrofauna of Lakes Długie and Miejskie. The lakes are situated in the city of Szczytno and are polluted with its sewage. The data can serve as a base for later possible action to improve the quality of the lakes. Samples were taken in a yearly cycle at two stations in Lake Miejskie (maximum depth of 3.8 m) and at two stations in Lake Długie (maximum depth of 4.7 m). There was marked stratification of the fauna in the lakes. At a depth of 3 m, the quantity of macrofauna was reduced and there was change in the qualitative aspects. In the littoral zone of both lakes only Chironomidae were relatively frequent. There was a substantial reduction in the quantity of larvae at the bottom of the lakes, due to excessive accumulation of hydrogen sulfide, sulfides, and ammonia, along with the frequent lack of oxygen in the layer just above the bottom.
[3 figures, 1 table, 25 references] FTP

9.19

Three swordfish weighing 6 pounds (2.7 kg) 100 pounds (45.4 kg), and an estimated 500 pounds (226.8 kg) contained mercury levels in white muscle of 0.04, 1.71, and 2.10 ppm, respectively.
[3 figures, 1 table, 7 references] Authors' abstract

Mills, J. (Sheffield Polytechnic, Sheffield, England)
CRC Critical Reviews in Environmental Control 4, No. 3, 341-351 (1974)

Information on the biodeterioration of plastics materials relative to types of biodeterioration, demonstrations and evaluation of biodeterioration, control of biodeterioration, and environmental problems associated with the general resistance of plastics to biological attack is discussed.
[1 table, 103 references] FTP

9.19 THE BIODETERIORATION OF SYNTHETIC POLYMERS AND PLASTICIZERS (9.8)

9.19
(9.8)

AIR POLLUTION AND MICROBIAL ECOLOGY

Babich, Harvey, and Guenther Stotzky (Dept. of Biology, New York University, New York, N.Y.)
CRC Critical Reviews in Environmental Control 4, No. 3, 353-408 (1974)

Literature on the interactions of and interrelationships between atmospheric pollution and micoorganisms are reviewed. The effects of pollution upon ecosystems, specifically microbial ecology, are stressed. The first section contains a brief introduction of the general concepts of atmospheric pollution; the areas of abiotic and biotic natural sources of pollution, anthropogenic sources of pollution, sinks and scavenging mechanisms, pollution chemistry, and pollution interactions are discussed. Next, a detailed examination is made of the microbial aspects of atmospheric pollution (microorganisms are sources of atmospheric pollution). In the third section, the effects, with reference to microbiology and ecology, of pollutants on microbes are discussed. A detailed examination is made of the effects of air pollution on microbial growth, morphology, reproductive capacity, and interactions (microbe-plant, microbe-animal). The final section deals with the effects of naturally occurring volatiles on the ecology, growth characteristics, and reproductive capacity of microorganisms and on their interactions.
[3 figures, 8 tables, 125 references] FTP

9.19

HEAD HAIR SAMPLES AS INDICATORS OF ENVIRONMENTAL POLLUTION

Corridan, John P. (University College, Cork, Ireland)
Environmental Research 8, No. 1, 12-16 (Aug. 1974)

Problems arising from open cast metal mining and of the value of taking head hair samples to indicate environmental pollution are discussed. Twenty-one pupils (with their parents consent) had hair samples taken for the analysis of copper, lead, arsenic, mercury, and zinc. The primary school was situated about ¼ mile from an open-cast mine in Ireland. The mine produced zinc and copper, and processing of the ore produced mercury and arsenic. The data are summarized in the table that follows.

Metal	Level of metal in head hair samples from 21 children		
	Maximum	Minimum	Mean
	p/m	p/m	p/m
Copper	46.1	12.0	22.5
Lead	12.2	0.4	3.1
Arsenic	6.1	0.3	2.1
Mercury	0.69	<0.05	0.215
Zinc	199	113	149

9.3

THE EMERGING RIGHT OF PHYSICAL ENFORCEMENT OF FISHERIES MEASURES BEYOND TERRITORIAL LIMITS

Bilder, Richard B.
Technical Report No. 222, University of Wisconsin Sea Grant College Program, 1225 West Dayton St., Madison, WI 53706 (July 1974), 28 pp.

The material in this article was presented at the Law of the Sea Institute Workshop on Problems of Fishery Jurisdiction and Enforcement: The Case of the North Atlantic Region, held January 14-17, 1974 at Hamilton, Bermuda. Questions concerning the issue of enforcement of a coastal state's authority over fisheries well beyond its territorial seas are discussed. The possibility of coastal states' jurisdiction governing fisheries 200 miles beyond its territorial seas has been considered in the concept of an "economic resource" or "patrimonial" zone at the United Nations Law of the Sea Conference held at Caracas in 1974. Enforcement of a coastal state's authority over the zone includes such possibilities as stopping, boarding, searching and seizing foreign fishing vessels; bringing such vessels into the coastal state's ports; and the trial of the offenders in the coastal state's courts. On the other hand, alternative international legal regimes should be considered in which the enforcement activities of coastal states in their extended zones are limited and subject to international safeguards. The probable shift by coastal states to recognization of broad fisheries zones should suggest a rethinking of traditional regulatory concepts, and traditional enforcement concepts.

Since the failure of the 1958 and 1960 Geneva Conferences to agree on territorial and fisheries limits, several coastal states have asserted claims to regulate fishing in extensive areas off their coasts. The claims include broader territorial zones,

9.7

HOW MUCH DOES THE PUBLIC KNOW ABOUT FISHING LIMITS?

Marriott, Alan (Grimsby College of Technology)
Fishing News International 13, No. 9, 65, 81 (Sept. 1974)

Fishing limits claims and negotiating positions of various governments have been made in the United Nations Law of the Sea Conference held at Caracas in 1974 and have been reported in newspapers and fishing journals. A survey, designed to find out how informed the general public is on this subject, was carried out in Grimsby, a large British deep-sea fishing port. Seventy-five townspeople and 25 dock workers were requested to answer a questionnaire consisting of seven questions. The first three questions were the most important: the first was, "Do you know what the present British fishing limit is?" Only 27 of the 75 townspeople and 17 of the dock workers gave the correct answer. The next question was, "Do you know of any countries which claim wider limits than Britain?" Nearly two-thirds knew that Iceland claimed wider limits than Britain, but less than half knew what they were. The proportion of dock-workers who knew the correct answers was higher than that of the townspeople. Only about 25% of the townspeople knew the British and Icelandic limits; among the dock workers 40% knew. The third question was, "Had you heard that there is an international conference planned to discuss fishing limits, among other things?" The question was asked at a date that was well before the start of the conference in Caracas. Only three townspeople knew the correct answer, although six had knowledge of a conference but did not know who sponsored it. None of the dock workers knew the correct answer although seven knew there would be a conference but did not know the sponsor. Only two of the townspeople knew that the conference would be held at Caracas; none of the dock workers knew the location. In answer to the question, "Where did you obtain your

9.19

The levels of copper and zinc in the hair of the children was normal; the levels of lead and mercury were comparatively low. The level of arsenic in the hair was comparatively high and the author suggests that this was due to environmental pollution of the school area. He concluded that head hair can be a useful indicator of environmental pollution by metals and that the analysis of hair is of epidemiological importance.
[25 references] FTP

9.19 MERCURY IN MARINE ALGAE (6.37)

Marderosian, Ara Der, Paul Ullucci, and Joe Hwang (Philadelphia Coll. Pharm. Sci., Philadelphia, Pa.)
Chemical Abstracts 81, No. 7, 34034 (Aug. 19, 1974)

9.7

information on this subject?" two-thirds indicated television as the source. The others indicated newspapers as a source of information. The author suggests that the fishing industry is not making a sufficient impact on the public with regard to information about itself.
[3 tables] SW

9.6 METRIC SYSTEM GUIDE -- VOLUME II

Anonymous
J. J. Keller & Associates, Inc., 145 West Wisconsin Ave., Neenah, WI 54956 (1974), $59.00

This is the second volume in a 5-volume series on the metric system, and deals with legislation and regulatory controls--both federal and all states. It presents proposals and/or enactments, both federal and state, concerning metrication in America, with controlling regulations. Featured is information on all major standards organizations, both national and international--background, graphs, and charts. Also included is detailed information on educational activities by states, and their current stand on metrication, weights and measures statistics, and a comprehensive glossary. Extracted

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9.8 THE UTILIZATION OF DISSOLVED FREE AMINO ACIDS BY ESTUARINE MICROORGANISMS

Crawford, C. C., and J. E. Hobbie (Zoology Dept., North Carolina State University, Raleigh, NC 27607), and K. L. Webb (Virginia Institute of Marine Science, Gloucester Point, VA 23063)
Ecology 55, No. 3, 551-563 (Late Spring 1974)

The importance of bacteria in cycling of carbon in the Pamlico River estuary was examined by measuring the rates of uptake of organic compounds. The rates of uptake of dissolved free amino acids and glucose, and the percentage of carbon subsequently respired as CO_2, were determined. The levels of the amino acids in the water were determined using ion-exchange chromatography. In addition, measurements were made of primary productivity and of the effects of the other amino acids in water upon the uptake of one amino acid.

Bacteria in the Pamlico River estuary take up dissolved free amino acids in about the same way that they take up glucose, acetate, and other organic compounds in the estuary and elsewhere. By such use of the dissolved free amino acids the bacteria contribute to the production of particulate organic matter in the estuary. Also, a significant portion of the CO_2 taken up in the form of amino acids is subsequently released as CO_2; the authors indicate that failure to measure this respiratory loss will result in the underestimation of total uptake by bacteria.

More than one-half of the dissolved free amino acids in the water was ornithine, glycine, and serine. The amino acids apparently originated from algal excretion products and the decay of algal cells.
[7 figures, 2 tables, 51 references] FTP

9.3

exclusive fisheries zones, conservation zones, and other claims. These expanding fisheries claims have caused recurrent international controversy, particularly when the coastal states take action to enforce their regulations as in the cases of Ecuador, Peru, and Iceland.

In several cases where coastal states have negotiated temporary accommodations with other states that were affected by extensive fisheries claims, the coastal states have accepted some limits on their enforcement powers. The Anglo-Icelandic agreement of November 3, 1973, for example, appears to modify Iceland's enforcement authority in its proclaimed 50-mile fisheries zone. Another example is the U.S. Brazilian Agreement Concerning Shrimp, signed May 9, 1972, which resolves, on an interim basis, certain conflicts between the two countries arising from Brazil's claim to a 200-mile territorial sea. The agreement limits the number of U.S. shrimp boats which may fish in certain areas off the Northern coast of Brazil; and the agreement establishes regulations under which Brazilian control is permitted, and punishment for violations is handled by U.S. authorities.

A flexible approach to the enforcement issue offers the possibility of achieving compromises that will promote a broad consensus and temporarily stabilize the law of the sea.
[24 footnotes] SW

9.19 (7.9)

SOME ASPECTS OF THE RECOVERY OF CHLORINATED RESIDUE (DDT-TYPE COMPOUNDS AND PCB) FROM FISH TISSUE BY USING DIFFERENT EXTRACTION METHODS

Hattula, Marja Liisa (Dept. of Chemistry, University of Jyväskylä, Jyväskylä, Finland)
Bulletin of Environmental Contamination and Toxicology 12, No. 3, 301-307 (Sept. 1974)

Organochlorine pesticides and PCB are soluble in fat and thus are stored in the fatty tissue of organisms. Complete extraction of such pesticide residues from animal tissues requires quantitative extraction of the fat. In this study, four solvent systems were tested in cold extraction of fish tissue in glass columns and in hot extraction in Soxhlet apparatus. The solvent systems consisted of diethylether, diethylether and n-pentene, n-hexane in acetone and diethylether in petroleum ether, and methanol and chloroform. The fish samples used were pike (lean fish), perch (medium fatty fish), and bream (fatty fish). The amount of fat and the amount of PCB, p,p'DDE, and p,p'DDT in the wet fish tissue of the three species of fish were determined using the various cold and hot extraction procedures.

The results indicated that the cold extraction of fish tissue is not comparable with hot extraction, especially when the residues level of the tissue is low. There is a large variation in fat extraction even if the material extracted is homogeneous. Thus, the author indicates, each extraction method should be tested for different materials and the results should state the limits of errors which are statistically tested.

[3 tables, 18 references] FTP

9.3 (1.87)

RESEARCH AND INFORMATION NEEDS OF THE FLORIDA SPINY LOBSTER FISHERY

Seaman, William, Jr., and Donald Y. Aska (Editors)
State University System of Florida Sea Grant Program, Marine Advisory Program, G022 McCarty Hall, Gainesville, FL 32611 (Apr. 1974), 64 pp.

The papers presented are the proceedings of a conference on the Florida spiny lobster fishery held March 12, 1974 in Miami, Fla.

The spiny lobster is the second most important commercial species; landings in 1972 were 11.4 million lb valued at $11.8 million. Increasing numbers of fishermen are entering the fishery, and competition for productive fishing space has caused increases in the catch effort and reduction in the harvest for each individual.

Theft of traps and and trapped lobsters is a serious problem that is described in one paper. Other papers contain discussions on limiting entry of fishermen into the fishery; biology of the spiny lobster in relation to recruitment and legal size; and disputes between the government of the Bahamas and Florida-based fishermen. The statistics and economics of the spiny lobster fishery are covered in two other papers. A paper was presented on the capabilities and applications of two computer programs for information retrieval of lobster data and bibliography. In a final section, Florida legislation authorizing regulation of the fishery is described. A chronological listing of spiny lobster publications of the Florida Dept. of Natural Resources is also given starting with 1951. SW

9.19

A SYSTEM FOR THE DETERMINATION OF CHRONIC EFFECTS OF POLLUTANTS ON THE PHYSIOLOGY AND BEHAVIOR OF MARINE ORGANISMS

Livingston, Robert J., Claude R. Cripe, Christopher C. Koenig, F. Graham Lewis, III, and Bruce Dennis De Grove (Dept. of Biological Science, Florida State University, Gainesville, FL 32611)
Report No. 4, Florida Sea Grant Program, Florida State University, Gainesville, FL 32611 (July 1974), 15 pp.

This paper contains a description of a laboratory system that can be used to carry out controlled experiments on the effects of low levels of pesticides on the behavior and physiology of certain species of estuarine organisms. The system uses high-quality seawater and can be used to determine quantitive changes in behavior of the organisms under closely controlled conditions. A soundproof controlled environment room is used, thus providing minimal distraction for the test organisms. By means of closed circuit television, continuous monitoring of the test organisms is possible. Four diagrams depict the seawater delivery system, continuous flow pesticide dilution system, the thermal gradient trough, and the temperature preference apparatus.

[7 figures, 12 references] FTP

9.6

FISHERY PUBLICATIONS, CALENDAR YEAR 1973: LISTS AND INDEXES

Engett, Mary Ellen and Lee C. Thorson (Scientific Publications Staff, National Marine Fisheries Service, NOAA, 1107 NE 45th St., Seattle, WA 98105)
NOAA Technical Report NMFS CIRC-390, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, Seattle, WA 98105 (Sept. 1974), 14 pp. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

Fifty-one publications issued by the National Marine Fisheries Service, National Oceanic and Atmospheric Administration, in calendar year 1973 in the following series are listed: NOAA Technical Report NMFS CIRC, Data Report, Fishery Facts, NOAA Technical Report NMFS SSRF, AND NOAA Technical Memorandum NMFS. The reports are listed numerically (with abstracts) and are indexed by author, subject, and geographic area. FTP

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Kroon, C. C. M.	3	0.4
Krumbein, W. E.	20	9.11
Kubo, Susumu (pat.)	16	6.34
Lampi, Ranno A.	17	7.8
Lapeyre, J. M. (pat.)	11	2.3
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Van Dijck, P. J.	3	0.5
Van Emden, H. M.	3	0.4
Van Pelt, R. W.	11	1.951
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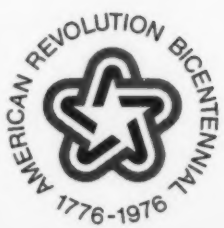
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